Photomechanisms Can...

15 Stepar Place, Huntington Station, L. I., New York

Photomechanisms Can...

- carry out research and development programs
- engineer and design systems
- build prototypes
- produce hardware in quantity
- meet rigid quality control specifications

on programs involving the application of photographic, optical, and electronic techniques.

PHOTOMECHANISMS Incorporated

15 Stepar Place, Huntington Station, L. I., New York
(516) HA 3-4411

Copyright, 1963 by Photomechanisms, Inc.

This brochure is copyrighted and its reproduction in any manner, in whole or in part, is expressly prohibited.

Photomechanisms, Inc. was founded in 1952 by a group of manager-engineers who saw the need for an organization specializing in solving data handling problems through the techniques of photography. Throughout its growth, Photomechanisms has defined photography in the broadest sense as the production of images on sensitized surfaces by the action of light or other forms of radiant energy.

As Photomechanisms has grown, so have its interests and capabilities and, today, these include mastery of such advanced photographic techniques as electrostatics, photo-polymerization, and other non-silver halide techniques. By concentrating on its chosen specialty and by developing a true systems capability, Photomechanisms has earned a reputation of which it is, understandably, proud.

Systems capability involving the application of photographic techniques to the complex problems of data origination, processing, display, and utilization calls for a high degree of technical competence in such areas as optics, mechanical engineering and machine design, photochemistry and processing techniques, electrical engineering, and electronics. Because of its specialization in these areas, Photomechanisms, together with its electronic affiliate, F. B. Mac Laren & Co., Inc. (electronic instrumentation, servos, and analog computers) provides within one contractor team a complete facility for development and production of highly specialized electromechanical instrumentation.

Photomechanisms' RAPIDATA trademark is being applied to a growing number of proprietary equipments for recording and display of graphic data as well as to unique, patented, automatic photoprocessors.

Both Photomechanisms, Inc. and F. B. Mac Laren & Co., Inc., have long and successful performance records on research and development contracts for a number of government agencies, both directly and on subcontract. As our experience has grown, so has our management and technical staff, and today we offer a highly qualified team capability for research and development work as well as for design and production in the following areas:

- Optics and optical systems
- Photographic chemistry and sensitometry
- Photographic processing techniques
- Special camera development
- Camera-processors for rapid data access

OVER

- Evaluation and utilization of new photographic materials and technology
- Optical instrumentation
- Electromechanical instruments
- Instrument servos and servo-amplifiers
- Analog computation systems
- Electronic circuitry
- Simulators and training devices using optical, servo, electromechanical and analog techniques

Clients who have profited by PHOTOMECHANISMS' unique ability to solve tough data handling problems include:

Airborne Instruments Laboratory
Arctic Institute of North America
Argentine Naval Commission
Armour Research Foundation
Bausch and Lomb Optical Co.
Bankers Trust Company
Brookhaven National Laboratory
Cornell University
Douglas Aircraft Company
Eastman Kodak Company
General Electric Company
General Dynamics/Fort Worth
General Motors Corporation
Houston Fearless Corporation
International Business Machines Corp.
Jet Propulsion Laboratory
The Johns Hopkins Hospital
Kalvar Corporation
Land-Air, Incorporated
Loral Electronics Corporation
Melpar, Incorporated
Philco Corporation
Picker X-Ray Corporation
Polaroid Corporation
Radio Corporation of America
Raytheon Company
Republic Aviation Corporation
Sperry Gyroscope Company
Tracerlab, Inc.
U.S. Air Force
U.S. Army Chemical Corps
U.S. Naval Training Device Center
U.S. Signal Corps
University of Alaska
Westinghouse Electric Corporation
Xerox Corporation

© 1963 PHOTOMECHANISMS, IN.

PHOTOMECHANISMS
Incorporated

PHOTOMECHANISMS
Incorporated

PHOTOMECHANISMS
Incorporated

PHOTOMECHANISMS
Incorporated

PHOTOMECHANISMS
Incorporated

PHOTOMECHANISMS
Incorporated

Personnel

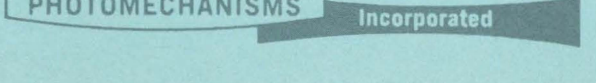
PHOTOMECHANISMS
Incorporated

PHOTOMECHANISMS
Incorporated

PHOTOMECHANISMS
Incorporated

PHOTOMECHANISMS
Incorporated

PHOTOMECHANISMS
Incorporated


PHOTOMECHANISMS
Incorporated

- Photographic photometry and sensitometry
- Rapid processing techniques
- Photographic Systems
- Automatic control instrumentation

FORDYCE M. BROWN
President

EDUCATION: University of Wisconsin, 1934-39, Ph. B. Physics
University of Rochester, 1939-41, Optics & Electronics

EXPERIENCE:

PHOTOMECHANISMS, Inc. - 1954 to Present

Co-founder of Photomechanisms. Directly responsible for sales and advertising. Technical advice and guidance on all programs with specific participation in concept and design as required.

SENIOR PHYSICIST, Kenyon Instrument Co. - 1948-54

Project responsibility for design, engineering and performance of photographic and electro-optical instruments, including:

- Three different military systems for CRT recording, processing and display
- Rapid processing 70 mm photofluorographic camera
- 40,000 frames/sec. image dissecting cameras
- Production run of market survey cameras
- Production run of 35 mm amateur cameras

PHYSICIST, Eastman Kodak Co., Kodak Research Laboratories - 1939-48

Performed applied research, engineering, testing and installation functions in photographic, optical and electromechanical fields, including:

- Sensitometry of film and paper emulsions
- CRT recording, rapid processing and display devices
- Automatic printers for black and white and color
- Plant production control and measuring equipment

PUBLICATIONS AND PAPERS

1. Sensitometric Study of Gaseous Condenser - Discharge Lamps- Photo Technique - September 1940
2. A System for the Rapid Production of Photographic Records - J. Franklin Inst 242 : No 3, 203-212 (1946)
3. High Speed Processing of 35 mm Pictures - J. Soc Mot Pic Tel Eng, 54 : 149-160, (1950)
4. Equipment and Methods for High-Speed Photographic Processing Phot. Eng., 3 : No 2, 65-77 (1952)

PATENTS

1. 2,446,628 - Flatness Testing Apparatus
2. 2,446,668 - Combined Camera, Processing Apparatus and Projector
3. 2,500,049 - Apparatus for Making Color Prints
4. 2,521,954 - Apparatus for Making Color Prints
5. 2,548,573 - Apparatus for Processing Continuous Film
6. 2,566,264 - Making Color Prints
7. 2,566,277 - Making Color Prints
8. 2,641,956 - Film Perforation Pitch Gauge
9. 2,665,619 - Apparatus for Processing Photographic Film
10. 2,880,325 - Photofluorography
11. 2,992,352 - Rapid Processing of Photographic Film

ORGANIZATION MEMBERSHIPS

Optical Society of America
Society of Motion Picture and Television Engineers
Society of Photographic Scientists and Engineers
New York Academy of Science
American Physical Society

© 1963 PHOTOMECHANISMS, INC

- High performance optical system design
- High accuracy gear trains
- Engineering and design of systems for use in space environment
- Thermally compensated structures and mechanisms
- Inertial test equipment

PAUL T. KAESTNER
Vice President, General Manager

EDUCATION: Stevens Institute of Technology, 1931-35, M.E.
New York University Accounting & Business Management, 1939

EXPERIENCE:

PHOTOMECHANISMS, Inc. - 1962 - Present
Responsible for operations, including engineering design and manufacturing. Detailed guidance in all phases of engineering and design.

PROJECT MANAGER, Kollsman Instrument Corp. - 1961-62
- Responsible for 38 in. aperture spectrophotometer to be used in the Orbiting Astronomical Observatory
- Responsible for concept and development of an optical digital encoder and a three axis automatic autocollimator

CHIEF ENGINEER, J. W. Fecker Div., American Optical Co. - 1955-61
Directed engineering, design and development on many optical and electromechanical equipments, including:
- Image stabilized monocular
- Scanning viewfinder for RB-57 aircraft
- Igor missile tracking telescopes
- Equatorial and trunnion type gyro test stands

SENIOR ENGINEER, Olin Industries - 1953-55
Direction of a group responsible for mechanical design and construction of laboratory and pilot plant film extruding equipments, including:
- Electronic and pneumatic width recorders
- Extrusion dies
- Continuous sheet flatness recorder

SYSTEMS ENGINEER, Perkin-Elmer Corp. - 1949-53

Project responsibility for military optical-mechanical instruments including:

- Prototype bombsight BDHSA
- High speed aerial camera lenses ranging from 24 to 144 in. focal length
- Direct viewing sight for fighter aircraft

PROJECT ENGINEER, Farrand Optical Co. - 1945-49

Project responsibility for military optical-mechanical instruments, including:

- Flight briefing trainer
- Hemisphere gunsight for B-36 and B-47 aircrafts
- 25 power pedestal binoculars for shipboard use

OTHER EXPERIENCE - 1935-45

- Chief Engineer of a heavy forging operation
- Engineering and installation of airport underground fuel systems
- Design of gasoline service station pumps
- Owned and operated jobbing machine shop
- Free lance tool design

PUBLICATIONS & PAPERS

1. Thermal Design - Product Engineering March 1956
2. Viewfinder - IRE National Convention on Electronics 1958
3. Gyro Test Tables - Military Systems Design Nov-Dec 1960
4. Space Optics Thermal Compensation - Annual Meeting Optical Society of America October 1962

PATENTS & PATENTS PENDING

1. 2,809,519 - Web Flatness Indicator
2. 2,939,363 - Optical Sighting Device
3. 2,992,334 - Follow-Up or Motion Duplicating Systems
4. 3,063,343 - Method and Apparatus for Supporting Optical Elements
5. Pending - Optical Scanning Device
6. Pending - Photo-Sensitive Autocollimating Device
7. Pending - 2-D Autocollimator and Method of Making
8. Pending - High Resolution Optical Encoder
9. Pending - Hybrid Optical Encoder
10. Pending - Tilt and Twist Analyzers

ORGANIZATION MEMBERSHIPS

American Society of Mechanical Engineers
Optical Society of America

© 1963 PHOTOMECHANISMS, INC

- Physics of the photographic image
- Rapid processing methods
- Recording and display systems theory
- Optical system requirements and configurations

ROBERT P. MASON
Vice President,
Research and Development

EDUCATION: Amherst College, 1949-54, B.A. Physics
Massachusetts Institute of Technology, 1952-54, B.S. Physics

EXPERIENCE:

PHOTOMECHANISMS, Inc., 1959 - Present

Research and development direction and planning. Technical proposal direction. Responsible for company security and personnel. Engineering and design participation on all programs as required.

Operation of R&D laboratory, supervision of product electrical wiring and performance testing.

DEPUTY BRANCH CHIEF, United States Government, 1954-59

Classified research and development in the field of electro-optical instrumentation with specific responsibility for projects involving:

- Specialized recording cameras
- Illumination systems
- Photoelectric devices
- Photogrammetric instrumentation
- Projection viewers and precision optics
- Electronic instrumentation

PHYSICIST, Eastman Kodak Co. - 1954

Participated in design updating program for Kodacolor print exposure equipment for Color Technology Division.

LABORATORY ASSISTANT, Massachusetts Institute of Technology - 1953

Operation and maintenance of the Institute's recording spectrophotometer.

LABORATORY TECHNICIAN,
DESIGN DRAFTSMAN, Gardner Laboratory, Inc. - 1948-53

- Various phases of instrument development and manufacture including assembly, wiring, calibration testing, servicing
- Design phases in special color measurement equipment
- Design, assembly, calibration and installation of Large Area Hunter Color and Color Difference Meter

PUBLICATIONS & PAPERS

An Advanced Technique for Short Delay Processing of Photographic Emulsions, Photographic Scientists & Engineers 5: No. 2, March-April, 79-86 (1961)

PATENTS

Pending - Automatic Copy Instrument

ORGANIZATION MEMBERSHIPS

Optical Society of America
Institute of Electrical and Electronic Engineers
Society of Photographic Instrumentation Engineers
American Physical Society

© 1963 PHOTOMECHANISMS, IN

- Product engineering and design
- Medical photographic instrumentation
- Rapid processor engineering and manufacturing
- Marketing and sales of technical photographic products

CARL J. BRASSER,
Vice President, Marketing
and Product Development

EDUCATION: Pratt Institute, 1937-39
Manhattan College, 1939-40, Mechanical Engineering

EXPERIENCE:

PHOTOMECHANISMS, Inc. - 1959 - Present

Marketing and product development direction. Cinefluorographic camera product development, sales and customer relations. Contractual negotiations on company products.

ENGINEERING MANAGER, Industrial Products Division, Fairchild Camera & Instrument Corp. - 1955-59

Responsibility for organization and operation of a divisional engineering department. In addition to management functions, had the following detailed technical responsibilities:

- Direction of all product engineering programs
- Engineering and production of a line of high speed motion picture cameras
- Engineering and production of photographic rapid processing equipments and accessories

CHIEF DESIGN ENGINEER, Optomechanisms, Inc. - 1953-55

Engineering and design direction of a 70 mm radar camera system incorporating automatic exposure control.

CHIEF DESIGNER, Kenyon Instrument Co. - 1948-49

Design responsibilities for the following military and government photographic systems:

- XW-4 rapid processing radar display and camera projection units
- 70 mm rapid processing photofluorographic camera employing 18 in. diameter Schmidt optics
- PAU rapid processing airborne radar display camera-projection units

LEAD DESIGNER, Perkin-Elmer Corp. - 1949

- Mechanical design responsibility for transverse panoramic camera for B-52 aircraft

CHIEF DESIGNER, X-Ray Instruments Corp. - 1947-48

- Design and development of a 35 mm amateur camera for quantity production
- Design of an 8 mm motion picture projector

SENIOR DESIGNER, Fairchild Camera & Instrument Corp. - 1941-47

- Amateur camera design and development
- Design of Model F-212 mass chest survey camera
- Design of ophthalmic camera for RCAF
- Design of mounts and controls for 0-15 radar camera

TOOL DESIGNER, E. W. Bliss Co. - 1939-41

- Production tooling for torpedo manufacture
- Design of equipment for assembly of British .303 and .505 caliber bullets

SENIOR DRAFTSMAN, Arma Corp. - 1937-39

- Torpedo data computer
- Tracking tables, electrical control and repeater panels

PATENTS

1 - 2,517,781 - X-ray Camera
2 - 2,880,325 - Photofluorography

ORGANIZATION MEMBERSHIPS

Society of Photographic Scientists and Engineers
Society of Photographic Instrumentation Engineers
Society of Motion Picture and Television Engineers

© 1963 PHOTOMECHANISMS, INC.

- Accounting and controls
- Finance and banking
- Government contracts
- Systems and budgets

H. HARRY FRANKLIN
Treasurer and Controller

EDUCATION: Columbia University School of Business, 1946-50, B.S. Economics
New York University Management Institute, 1956
Enrolled Public Accountant, State of New York

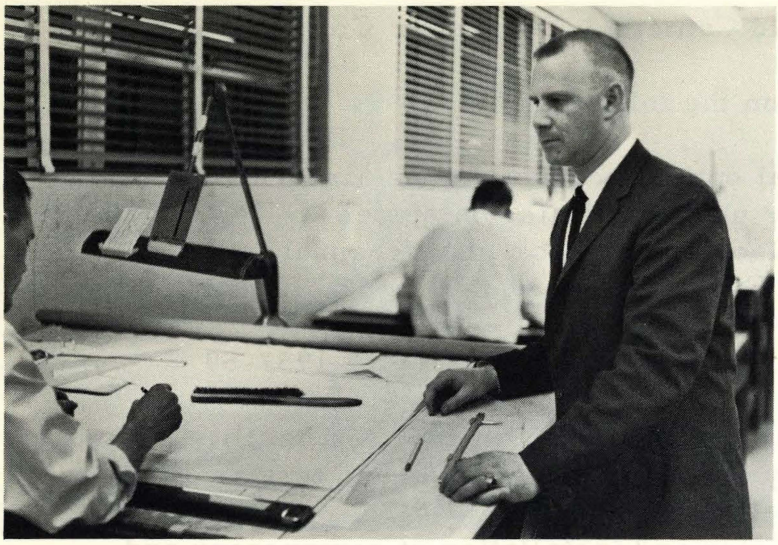
EXPERIENCE:

PHOTOMECHANISMS, Inc. - 1962 - Present

Responsible for accounting, cost reporting, internal controls, finance and financial reporting and government contracts.

CHIEF COST ACCOUNTANT, FXR Div. Amphenol-Borg Electronics Corp. - 1960-62

Complete charge of cost accounting department. Participated in installation of new job order cost system on IBM, working closely with Peat, Marwick, Mitchell & Co.'s systems group. Supervised and directed accounting department. Fully responsible for job cost reporting to management, perpetual inventories, departmental cost control, and preparation of detailed cost analyses and reports, monthly P&L statements. Negotiation with government auditors, rate submissions and all other contract matters.



- Engineering and design of complex photo-instrumentation
- Gas turbine development
- Electronic control design and system integration
- Air conditioning application and engineering

ELLIOTT P. SMITH, P.E.
Chief Engineer

EDUCATION: Pennsylvania State College, 1949-53, B.S.M.E.
Keesler AFB Electronics School, 1953-54
Fairchild Engine Division, Courses in Turbine and Compression Design, 1957
Carrier Corp. Engineering Training Program, 1952
Licensed Professional Engineer, State of New York, 1960

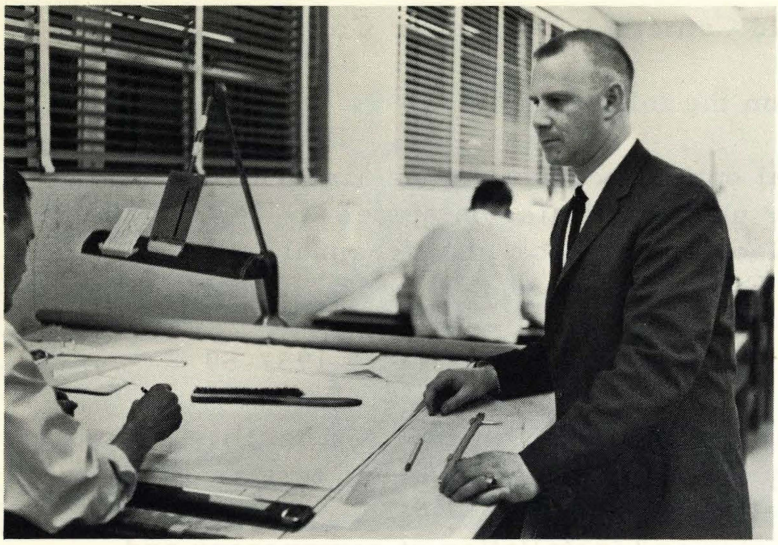
EXPERIENCE:

PHOTOMECHANISMS, Inc., 1962 - Present

Responsible for all engineering and design activities in the company.

Project responsibility for:

- 70 mm print copying cameras for volume production of commercial print copy negatives
- RAPIDATA® Model 904, 70 mm rapid film processors for telemetered data processing
- RAPIDATA® Model 697, 70 mm camera-processor-viewer retrofit program
- RAPIDATA® Model 1052, 70 mm camera-processor-viewer production prototype program
- 16 mm cinefluorographic cameras



- Engineering and design of complex photo-instrumentation
- Gas turbine development
- Electronic control design and system integration
- Air conditioning application and engineering

ELLIOTT P. SMITH, P.E.
Chief Engineer

EDUCATION: Pennsylvania State College, 1949-53, B.S.M.E.
Keesler AFB Electronics School, 1953-54
Fairchild Engine Division, Courses in Turbine and Compression Design, 1957
Carrier Corp. Engineering Training Program, 1952
Licensed Professional Engineer, State of New York, 1960

EXPERIENCE:

PHOTOMECHANISMS, Inc., 1962 - Present

Responsible for all engineering and design activities in the company.

Project responsibility for:

- 70 mm print copying cameras for volume production of commercial print copy negatives
- RAPIDATA® Model 904, 70 mm rapid film processors for telemetered data processing
- RAPIDATA® Model 697, 70 mm camera-processor-viewer retrofit program
- RAPIDATA® Model 1052, 70 mm camera-processor-viewer production prototype program
- 16 mm cinefluorographic cameras

SENIOR ENGINEER, Fairchild Camera & Instrument Corp. - 1959-62

Project responsibilities on the following:

- Electromechanical optical scanner for an airborne data link
- Ground station for phototransmission system
- Satellite-borne electromechanical multichannel timer
- Supervisor of the Engineering Laboratory

TEST ENGINEER, Fairchild Engine & Aircraft Corp. - 1957-59

- Responsible for all testing in the altitude test facility of the gas turbine laboratory including preparation and testing of full scale gas turbine engines.
- Participated in design and installation of compressor and altitude test cells.

AIRBORNE ELECTRONICS OFFICER, United States Air Force, 1953-57

- Supervised electronic maintenance activities for various fighter squadrons.
- Air Force management improvement award for developing an aircraft fuel cell leak detector.

ENGINEER, Carrier Corp. - 1952

Directed preproduction fabrication and testing of residential heating - air conditioning units.

© 1963 PHOTOMECHANISMS, IN

- Photo-reconnaissance system development and design
- Facsimile system design and development
- Optical and electromechanical instrumentation
- Electrostatic recording and copying techniques

WILLIAM L. KACIN, P.E.
Program Manager

EDUCATION: Cooper Union School of Engineering, 1954-59, B.S.M.E.
Hofstra College, 1959-Present, Candidate for M.B.A.
Licensed Professional Engineer, New York State

EXPERIENCE:

PHOTOMECHANISMS, Inc. - 1963 - Present

Responsible for product development programs

CHIEF MECHANICAL ENGINEER,
Facsimile Products, Fairchild Camera & Instrument Corp. - 1962-63

Responsible for supervision of the mechanical engineering, drafting and mechanical technician groups in development and production of high and low speed facsimile communication equipment.

Directed and participated in electromechanical fiber-optic scanning research and electrostatic recording research and development.

Assisted in negotiations for selection of plant equipment for the production of facsimile recording paper.

ASSISTANT PROGRAM MANAGER, Fairchild Camera & Instrument Corp. - 1960-62

Organization and administration of the program for, and the design and development of a military airborne photo-reconnaissance system.

As project engineer was responsible for the engineering and design supervision of an airborne opto-electromechanical film scanner.

SENIOR MECHANICAL ENGINEER,
PROJECT SUPERVISOR, Hogan Faximile Corp. - 1956-60

Project supervision for the development of a commercial high speed multi-channel instrumentation recorder and computer readout.

Engineering and development of a number of multi-stylus facsimile recorders and radial slit type flying spot scanners.

DESIGNER, Mackay Radio & Telegraph Corp. - 1952-56

Cabinet and control panel design. Layout and packaging of electronic equipment and the design of associated mechanical equipment.

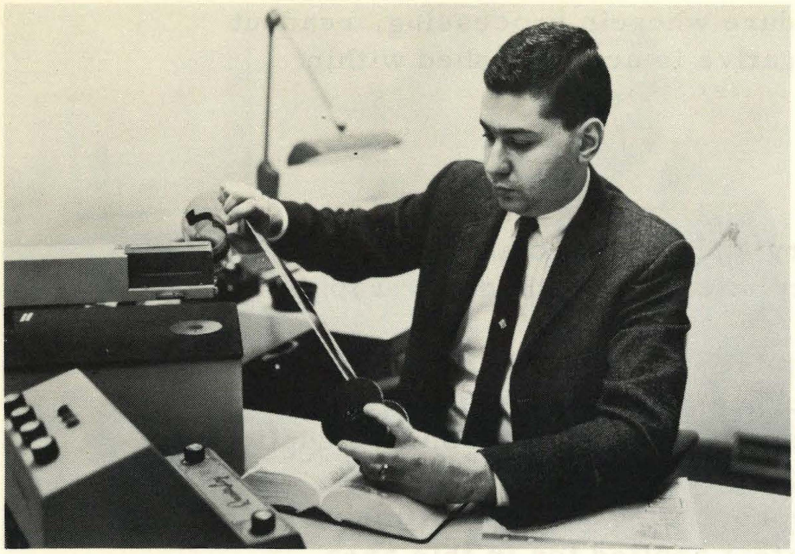
PATENTS

1. 2,935,722 - Electrical Socket Connector with Mercury Contact
2. Pending - Recorder Drying Mechanism
3. Pending - Copy Feed Mechanism

ORGANIZATION MEMBERSHIP

American Society of Mechanical Engineers

© 1963 PHOTOMECHANISMS, INC.



- Engineering of rapid processing systems
- Processing equipment engineering
- Photographic materials evaluation
- Photographic chemical formulations
- Thermodynamics

MELVYN S. COHEN
Research Engineer

EDUCATION: University of Rochester, 1955-59, B.S. Chemical Engineering
Polytechnic Institute of Brooklyn, 1959 - present toward M. Ch. E.

EXPERIENCE:

PHOTOMECHANISMS, Inc., 1961 - Present

- Responsible for special chemical formulations for automatic photoprocessing equipment where severe restrictions in time and performance are imposed.
- Conducts evaluation of photographic materials and processes for sensitometric and image quality.
- Conducts liaison with chemical and film manufacturers to assure best utilization of available products.
- Project engineering of miniature bacteria counter for a space probe experiment.
- Responsible for chemical supply support of processing equipment and development of research equipment for company sponsored programs.

ENGINEER, Fairchild Camera & Instrument Corp. - 1959-61

Employed in the photoprocessing group having its own research and design facilities. Participated in development of:

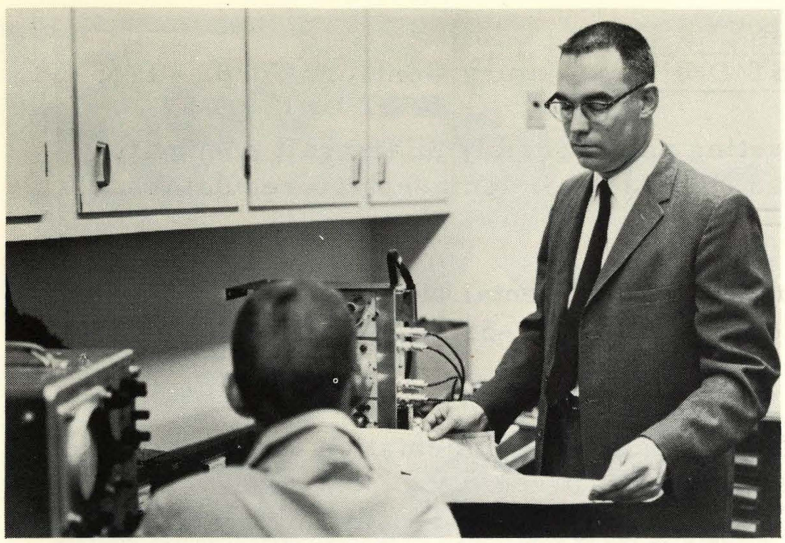
- Prototype photographic transmission system for rapid in-flight viscous processing of aerial reconnaissance films.

Spray processing procedure wherein processing, readout and projection of the negative is accomplished within five seconds.

Conducted research on:

- Investigations of military and commercial films to determine their emulsion characteristics and methods for rapid processing.
- New fixation chemicals which culminated in the preparation of ultra-fast monobath processing solutions.
- Diazo light sensitive materials for high resolution duplication of photographic images.
- Investigations of "web" processing of aerial films with monobath solutions. Patent applied for in this area.

© 1963 PHOTOMECHANISMS, INC.



- Electrical component evaluation and selection
- Electrical system control logic
- Product improvement engineering
- High vacuum engineering
- High voltage supplies
- Circuit encapsulation

FRED S. DAVIS
Electrical Engineer

EDUCATION: University of Pennsylvania, 1941-43, 1946-47, Electrical Engineer
University of Tennessee Extension School, 1951

EXPERIENCE:

PHOTOMECHANISMS, Inc. - 1960 - Present

Project engineering on:

- Training device for artillery spotting
- Cinefluorographic camera manufacture and service

CONSULTING ENGINEER, Chandler-Evans Corp. - 1960

- Development of long-life potentiometer manufacturing methods
- Product improvement engineering on commercial potentiometers

PROJECT ENGINEER, Farmingdale Manufacturing Corp. - 1958-60

- Design and development of long-life electrical potentiometer
- Design and development of improvements for textile weaving looms
- Supervised machine shop production and purchasing

PROJECT ENGINEER and ENGINEER IN CHARGE OF ASSEMBLY & TEST DEPT., Century Controls Corp. - 1955-58

- Supervised design testing and assembly of aircraft pneumatic valves, turbine speed controls, air temperature regulators, cryogenic valves.

ENGINEERING ASSISTANT, Nuclear Experimental Dept., A.N.P. Division, General Electric Co. - 1951-55

- Development of nuclear reactor instrumentation and controls
- Development of pulse type amplifiers
- Development of low current DC amplifiers for ionization chambers

ELECTRONIC TECHNICIAN, Oak Ridge National Laboratory - 1951

- Design and construction of very high voltage power supplies
- Repair and design improvements on Cockroft-Walton (300KEV) and Van De Graaf (2MEV) particle accelerators

RESEARCH ASSISTANT, Experimental Physics Section, NEPA Division, Fairchild Engine & Airplane Corp. - 1949-51

- Design and construction of electronic and mechanical devices, high vacuum systems, radiation counter tubes
- Organized and supervised machine shop

© 1963 PHOTOMECHANISMS, INC.

- Production planning and supervision
- Cost estimating
- Tool design

LEON LIEBERMAN,
Production Manager

EDUCATION: Wentworth Institute, 1944, Basic Engineering
Pratt Institute, 1947-49, Machine & Tool Design

EXPERIENCE:

PHOTOMECHANISMS, Inc. - 1962 - Present

- Complete control and administration of all aspects of manufacturing and assembly on R&D and production equipment
- Cost estimating, subcontract administration
- Technical assistance in design and engineering as needed

SUPERVISOR, Purchasing and Subcontracting,
Shepherd Electronic Industries, Inc., 1961-62

- All cost controls, estimating and proposal preparation
- Tool and product design

PRODUCTION COORDINATOR, Belock Instrument Corp., 1951-61

Responsible for all levels of production, including planning, programming, follow-up and expediting for various missile programs, including:

- Convair program timer
- Steering gyro MK39
- KS-3A camera group

MACHINIST, 1946-51, For precision instrument firms.

© 1963 PHOTOMECHANISMS, INC.

- Precision electromechanical instrument design
- Analog computer and servo system theory, design and logic
- Fire control computer design
- Automation systems
- Servo amplifiers
- Electronic circuit development
- Analog components

FRED B. MAC LAREN
President, F. B. Mac LAREN & CO., INC.
Director, PHOTOMECHANISMS, Inc.

EDUCATION: Yale University, 1932-36, B.E. Electrical Engineering

EXPERIENCE:

F. B. Mac LAREN & CO., INC. - 1957 - Present

Administration, technical direction, engineering and design participation in all programs as required. Adviser to Photomechanisms on servo instrumentation and electronic problems.

SELF EMPLOYED - 1950-57

Engineering consultant to a number of companies on precision electro-mechanical components and systems for military and commercial uses. Manufactured custom designed servomechanisms and associated electronic amplifiers and systems.

ENGINEER IN CHARGE OF COMPUTER GROUP, Perkin-Elmer Corp. -1949-50

Conceived and supervised computer design of BDHSA(MA-2) bombing-navigation system.

CHIEF ENGINEER, Servo Section, Servo Corporation of America - 1948-49

In charge of a group engaged in servomechanism, missile guidance, computer and infrared tracker development.

ENGINEER IN CHARGE OF COMPUTER GROUP, Glenn L. Martin Co. -1946-48

Conceived the design and headed development of a novel electromechanical airborne fire control computer for fighter aircraft.

OFFICER IN CHARGE OF ANTI-AIRCRAFT FIRE CONTROL DEVELOPMENT, U.S. Army Ordnance Dept. - 1941-46

Supervised development work at prime contractors' plants on electronic, mechanical and optical computers, sights, gun position servos, automatic fuze setters and remote control systems.

ENGINEER IN CHARGE OF ELECTRONIC DEVELOPMENT, The Bristol Co. - 1937-41

Conducted all electronic development work on industrial telemetering systems, servo recorders and automatic controllers of temperature, pressure, humidity, etc.

PUBLICATIONS & PAPERS

1. Electronic Temperature Control System - Electronics 1939
2. Effectiveness of Our Anti-Aircraft Fire Control Systems - Paper before IRE March 1946
3. Servomechanisms for Industry - Applied Hydraulics Sept-Oct 1953
4. Selecting Sources for Precision Potentiometers - Industrial Electronic Distribution Nov-Dec 1961

PATENTS

1. 2,153,986 - Electronic Control System for Self-Balancing Instruments
2. 2,234,184 - Electronic Control System
3. 2,326,239 - Electrothermally Operated Circuit Controller
4. 2,340,605 - Protective Device
5. 2,850,606 - Variable Resistor
6. Pending - Scanning Device

ORGANIZATION MEMBERSHIP

Radio Club of America

© 1963 PHOTOMECHANISMS, INC

- Solid state circuit development
- Servo theory and applications
- Analog computer systems and components
- Electronic circuit theory and development
- Electromechanical instrument design
- Servo amplifier development and packaging

HENRY M. MOSKWIK,
General Manager, F. B. Mac Laren & Co., Inc.

EDUCATION: Hofstra College, 1949-58, B. S. Physics
Brooklyn Polytechnic Institute, 1948-49, Mathematics
RCA Institutes, Inc., 1944-46, Electronics

EXPERIENCE:

F. B. Mac LAREN & CO., INC. - 1957 - Present

Administration, supervision of all research, development, design and drafting work. As Senior Project Engineer, generates test procedures, test reports, specifications, servo computations, etc. Coordination of engineering design concepts, origination of gearing schematics, electrical schematics and special test equipment. Customer liaison and preparation of technical proposals and cost estimates.

LABORATORY MANAGER, F. B. Mac LAREN, ENGINEERING CONSULTANT - 1955-57

In charge of all development, design and production of custom servo systems, special electronic test equipment, electronic circuits, automatic lens inspection devices and special purpose analog computers.

SENIOR TECHNICIAN,
ENGINEER IN CHARGE OF
LABORATORY & MODEL SHOP, Servomechanisms, Inc. - 1947-55

Supervised the development of induction and synchronous instrument motors, temperature stabilized rate generators, electromechanical modulators, special purpose servo amplifiers, X-Y recorders, potentiometer test equipment and miscellaneous electronic circuits. Design, development, packaging and testing of hermetically sealed amplifiers, various analog computers, servo systems and recorders.

PHOTOMECHANISMS Incorporated

PHOTOMECHANISMS Incorporated

PHOTOMECHANISMS Incorporated

PHOTOMECHANISMS Incorporated

PHOTOMECHANISMS Incorporated

PHOTOMECHANISMS Incorporated

Facilities

PHOTOMECHANISMS Incorporated

PHOTOMECHANISMS Incorporated

PHOTOMECHANISMS Incorporated

PHOTOMECHANISMS Incorporated

PHOTOMECHANISMS Incorporated

PHOTOMECHANISMS Incorporated

As unique, and as peculiar to Photomechanisms as its capability, is the physical plant that houses this unusual design and production organization. Designed expressly to meet the needs of Photomechanisms, this 14,000 sq. ft. plant was built in 1960 in close proximity to the great centers of Long Island's aircraft and electronic industries.

This modern, fully air conditioned plant is divided into production, engineering and administrative areas each of which is laid out in such a way as to facilitate optimum service to Photomechanisms' customers, and optimum performance on contracts.

The production department includes both shop and assembly areas and is fully equipped with modern machine and hand tools in sufficient quantities to permit production of electronic, photographic, optical, or electro-mechanical equipments in any quantity. Photomechanisms' production staff are skilled instrument makers who produce breadboards, prototypes, or production hardware with equal ease.

The engineering area includes offices and laboratories, as well as a fully equipped drafting and design facility. The laboratories which are the heart of Photomechanisms' unique capability, include an optical laboratory, an electrical laboratory and a sensitometry laboratory. Each is equipped with up to date equipment for both basic and applied research in the areas of Photomechanisms' specialization.

PHOTOMECHANISMS
Incorporated

PHOTOMECHANISMS
Incorporated

PHOTOMECHANISMS
Incorporated

PHOTOMECHANISMS
Incorporated

PHOTOMECHANISMS
Incorporated

PHOTOMECHANISMS
Incorporated

Experience

PHOTOMECHANISMS
Incorporated

PHOTOMECHANISMS
Incorporated

PHOTOMECHANISMS
Incorporated

PHOTOMECHANISMS
Incorporated

PHOTOMECHANISMS
Incorporated

OFF-LINE
PHOTOPROCESSOR

- Accepts exposed film in camera cassette
- Threads simply
- Processes for archival permanence
- Spools dry, processed film

SENSITOMETRIC 70 mm
PHOTOPROCESSOR

HOW IT WORKS

70 mm film in a cassette containing up to 100 ft is continuously processed by porous applicators in four, high-temperature chemical application steps. The processed film is passed through a short drying chamber and is wound on an internal take-up reel. The unit is completely self contained and produces high quality results meeting archival requirements for image permanence.

ENGINEERING CAPABILITIES APPLIED

- Photoprocessing by simple, single-side, fluid application
- Sensitometric process control
- Chemical formulation and processing for archival permanence
- Accelerated, elevated-temperature processing

ADVANCED THE STATE OF THE ART

TECHNICAL DATA

The fully automatic processor measures only 26x17x12 inches. It employs a seven section RAPIDATA® porous applicator photoprocessor which develops, fixes, neutralizes and washes Tri-X Reversal Film (SO-234) to a negative. The processed film has a fog level below .03, and a maximum density above 2.8 with a gamma of 1.90 controlled to ± .05. The film transport rate is 7.5 in./minute. Prepackaged, standard solutions fit directly into the processor.

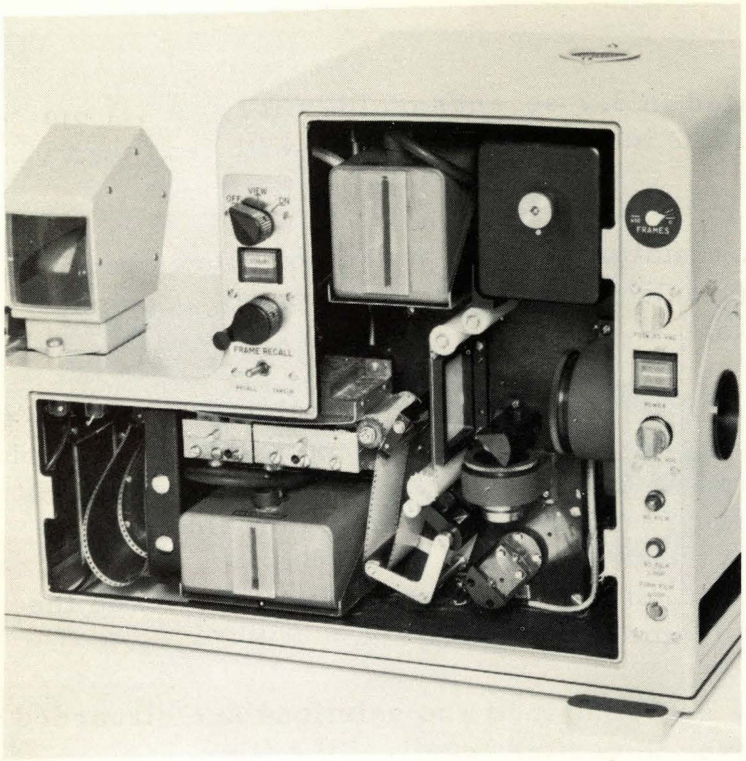
A simple, peristaltic pump uniformly meters solutions at 130°F to the applicators and onto the emulsion side of the film. No parts of the processor touch the emulsion surface. Excess and expended solutions are drained away by gravity and collected in an internal waste container.

A single switch actuates the processor and when processing is completed, an indicator light comes on and the processor shuts down. The unit weighs approximately 40 lbs and consumes a maximum of 250 watts. No plumbing connections are required.

Cover open showing the short and easily threaded film path. Seven separate applicator heads provide extreme flexibility for negative, reversal or simple color processes.

© 1963 PHOTOMECHANISMS, INC

ON-LINE
RECORDER-PROCESSOR-VIEWER



- Photographs a CRT face and data display
- Processes the 70 mm film image
- Displays a photographic sequence with a 1-1/2 minute delay

SATELLITE GROUND STATION
RECORDER-DISPLAY UNIT

HOW IT WORKS

A lens records a CRT display on stationary film. The camera pulls exposed frames into a loop and feeds continuously from the loop into the processor. The film is developed, fixed, washed, dried and fed over an illuminator for magnified viewing.

ENGINEERING CAPABILITIES APPLIED

- Low distortion optical image formation
- Simplified, rapid access photoprocessing
- Sensitometric photographic process control
- Control logic to permit acceptance of varying input rates
- Proven design for practical field operation and service

ADVANCED THE STATE OF THE ART

TECHNICAL DATA

A frame of information is generated in 8.2 seconds on the CRT. A 1:1 optical system images the display onto a 2x2 inch area on the film with less than 0.1% distortion.

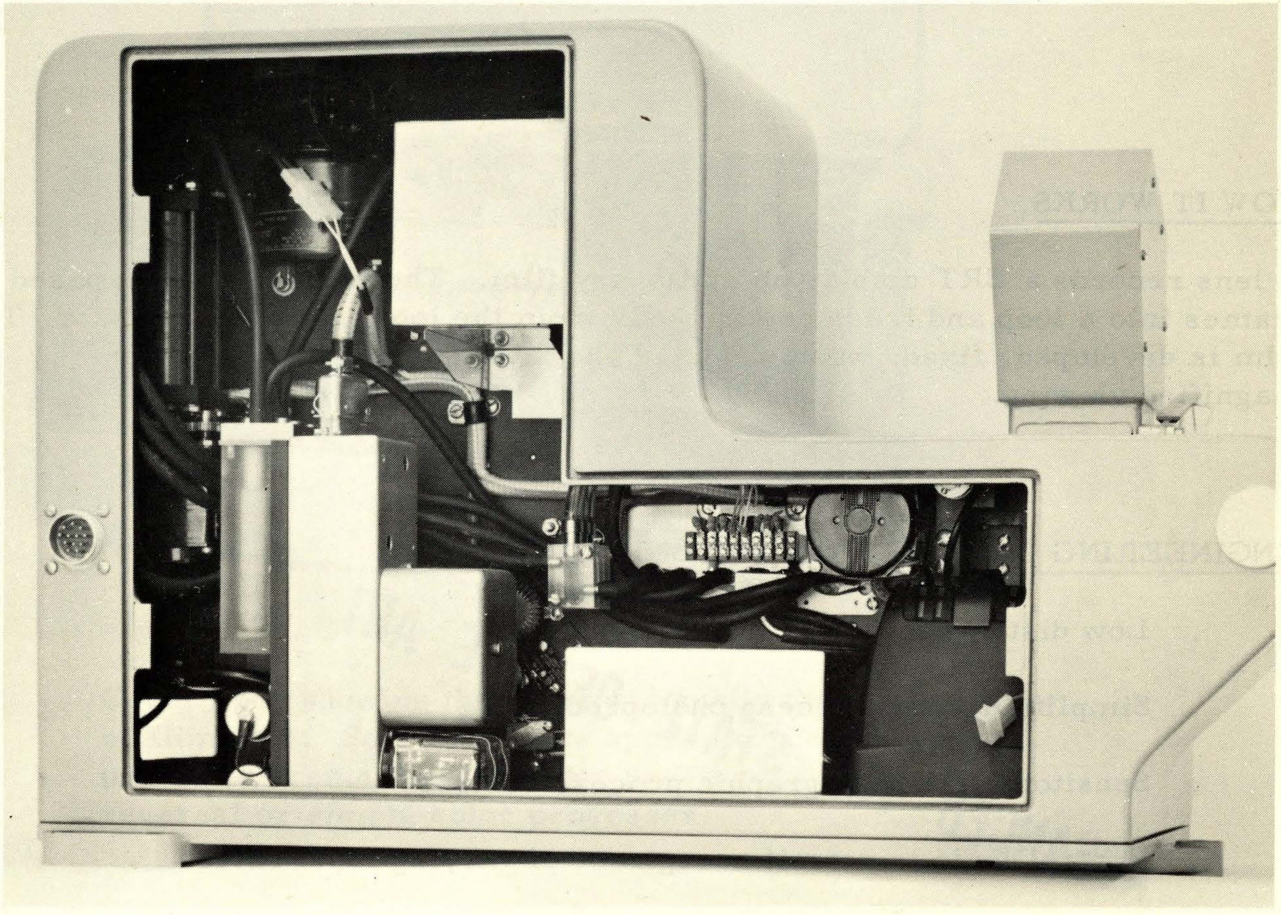
A buffer loop between the exposure station and the processor allows continuous processing at the rate of 20 in./minute. Film used is Recordak Dacomatic supplied in daylight loading spools.

The processor is a RAPIDATA® porous-applicator type, using a developer and rapid-clearing stabilizer, providing several years of image life. The simple processor uses a peristaltic pump and thermostatically controlled solution heaters operating at 130°F, and applies liquid to the emulsion side only.

A slack box with a capacity for 16 ft. of film between the processor and the viewer allows time for frame-by-frame visual analysis.

The solution supply is completely self contained and solutions are discarded as used, assuring uniform results over the entire length of the film.

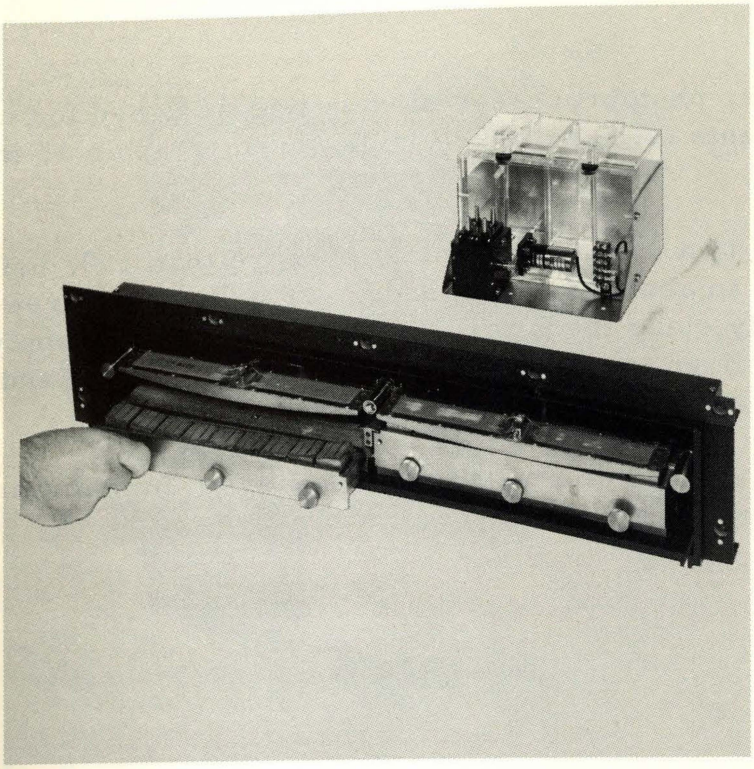
The unit measures about 14x12x24 inches and weighs about 50 lbs.



Rear cover removed showing simplicity of film drive and solution supply systems.

© 1963 PHOTOMECHANISMS, INC.

ON-LINE
PHOTOPROCESSOR



DEVELOPMENTAL HIGH SPEED
PROCESSOR

- Couples to a film recording unit
- Supplies processed film to a readout system
- Processes 35 mm film at 240 inches per minute

HOW IT WORKS

Two, one foot long, multiple, porous-applicator assemblies develop and fix Hyscan film in about three seconds in each unit.

ENGINEERING CAPABILITIES APPLIED

- Simplified high capacity film processing by porous-applicator
- Modular design of a compact processor

TECHNICAL DATA

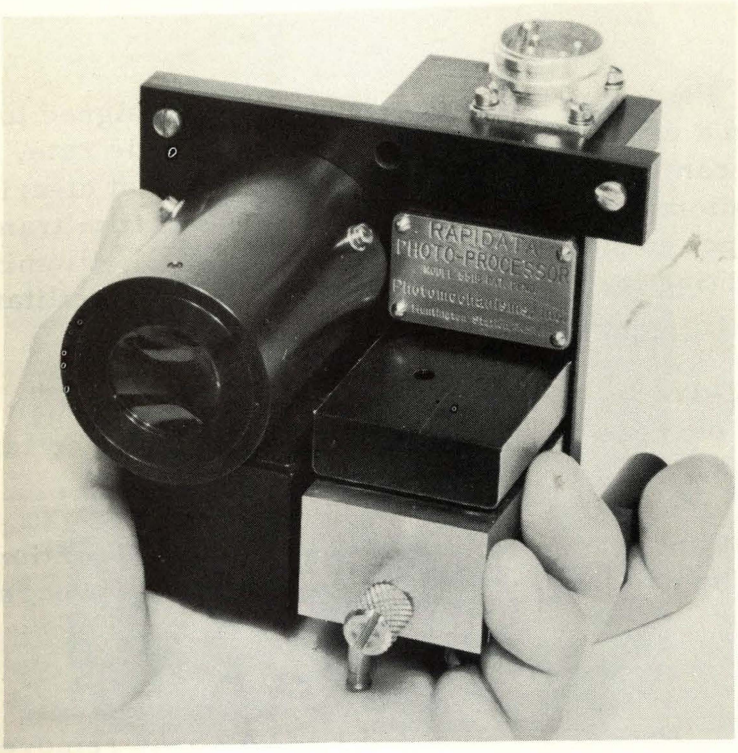
A RAPIDATA® porous-applicator, photoprocessor module was designed for use in a system which had requirements for a relatively high speed variable 35 mm film transport rate.

This unit processes Hyscan film to a maximum density of more than 1.0, using solution temperatures of 130°F, in about three seconds. An additional three seconds is required to completely clear the film. A pump and solution supply package feeds the developer and fixer to the porous applicators. Rinsing and drying is accomplished by other associated equipment.

The processor package measures approximately 28x5x5 inches. The solution containers are located at a convenient point a few feet away.

© 1963 PHOTOMECHANISMS, IN

ON-LINE
PROCESSOR-VIEWER



- Couples to a film recording unit
- Processes 35 mm film at 2-1/2 inches per minute
- Displays 2X magnified film image

MINIATURE PROCESSOR-VIEWER

HOW IT WORKS

Two small porous applicators sequentially develop and fix at varying transport rates. The processed film is observed as it moves across an illuminated area behind a magnifying lens.

ENGINEERING CAPABILITIES APPLIED

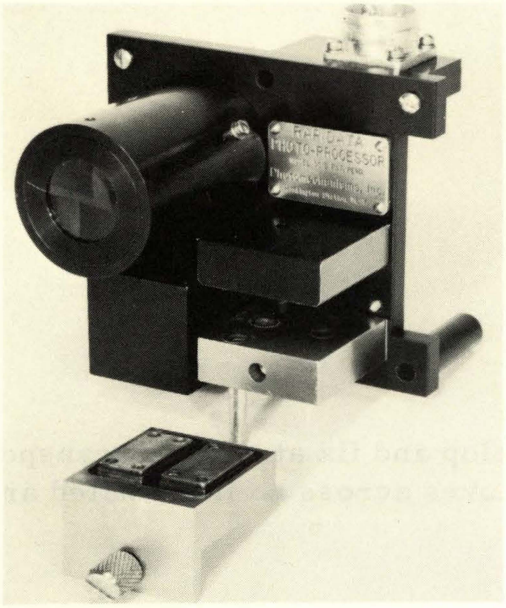
- Porous-applicator processing
- Modular construction of a processor-viewer as a component in a system

TECHNICAL DATA

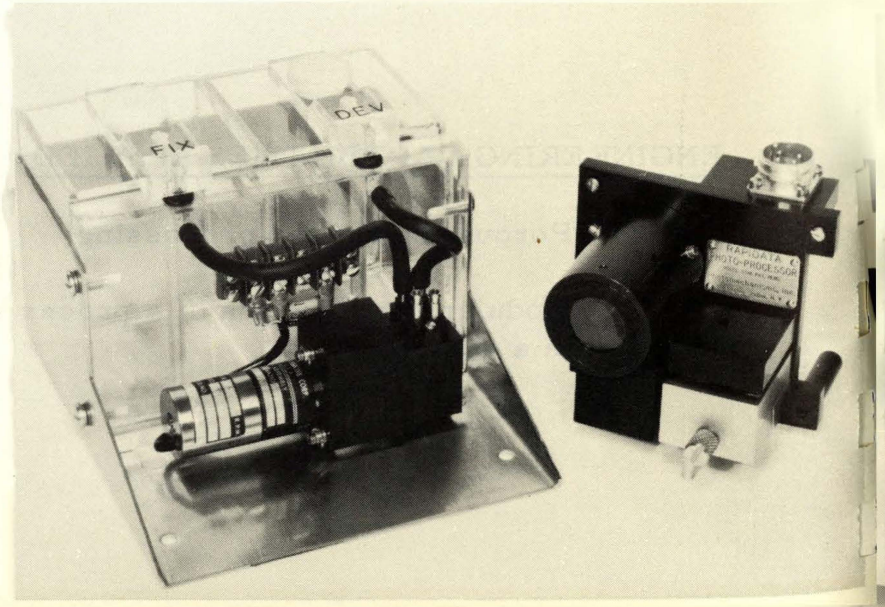
This small two-step RAPIDATA® Photoprocessor and Viewer was designed to provide a quick-look capability in a camera system employing variable rate, continuously moving, 35 mm Hyscan film. A monobath and subsequent clearing solution provided consistent sensitometric results over the range of film transport rates. It includes two 1/2 inch long porous applicators, a small, illuminated, diffuse screen for back-lighting the film, and a 2X magnifier to facilitate image observation.

While the unit operated at about 2-1/2 in. /minute with the chemicals used, it is possible to increase the rate and decrease the access time to 5 seconds or less, using other chemical formulations.

An associated solution supply unit and pump package is required for operation of the processor. No provision for driving the film is included in this processor module.



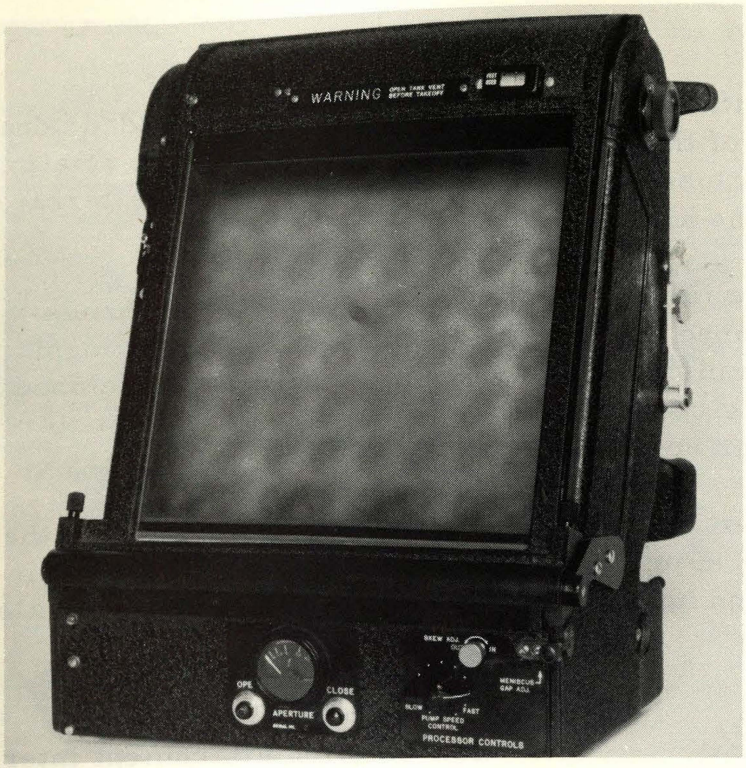
Processor with RAPIDATA® head removed showing developer and clearing solution applicators.



Complete system showing separate solution supply and pump assembly.

© 1963 PHOTOMECHANISMS, INC

AIRBORNE CAMERA-PROCESSOR



SIDE-LOOKING RADAR RECORDER-VIEWER

- Records side-looking radar data
- Processes the record on 9-1/2 inch film
- Displays radar map on 9x9 inch screen for immediate viewing

HOW IT WORKS

A space and time-shared CRT line display is imaged on moving film. The exposed film is processed by a monobath with a porous-roller applicator and moved over an illuminated screen for viewing.

ENGINEERING CAPABILITIES APPLIED

- On-line, short delay, airborne rapid processing
- Dual, folded, optical system to produce true map image from time and space-shared, single-line display
- Precision, servo controlled continuous film drive

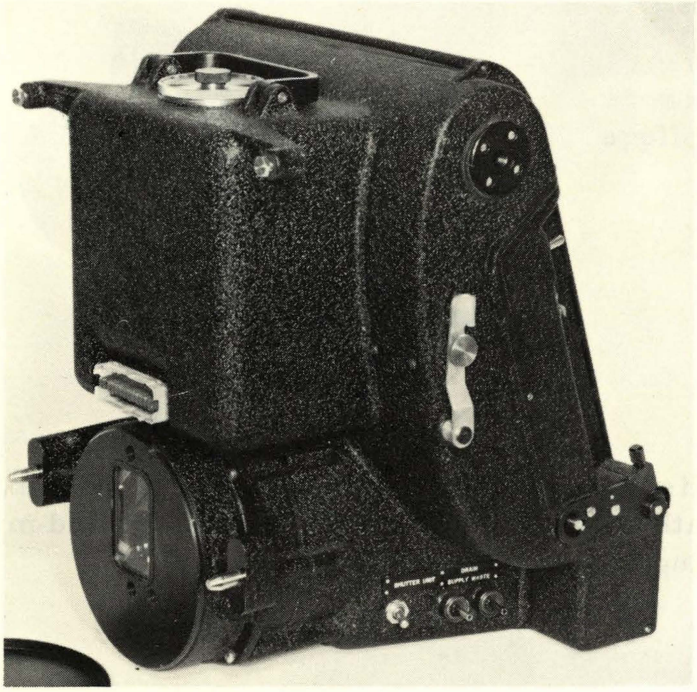
ADVANCED THE STATE OF THE ART

TECHNICAL DATA

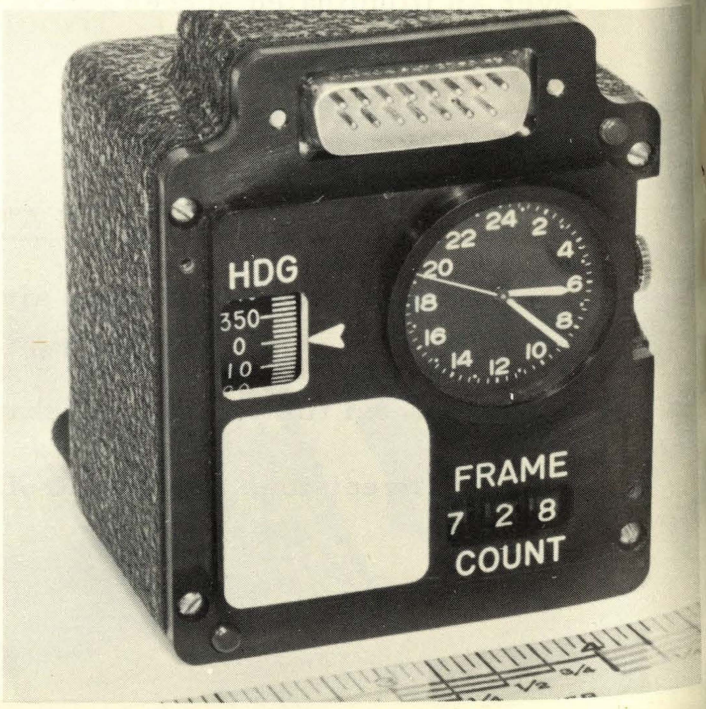
The camera-processor package attaches to a CRT display unit. A folded, dual, optical system forms two images of the CRT line scan, end to end. A rotating shutter alternately blanks and discloses the images corresponding to alternate radar returns from each side of the aircraft.

A monobath solution processes the film as it moves past a rotating, porous-roller, applicator. Solution, pumped through the roller axis, forms a meniscus between the roller and the film emulsion surface. Exposed film is developed and cleared for viewing with a time lag corresponding to less than 3/4 in. of film travel. The film dries as it moves upward across the 9x9 in. viewing area.

A radar map of the ground is generated with the track of the aircraft down the middle. The film velocity is kept in proportion to the ground speed of the aircraft by a servo control. Time and heading data are recorded at intervals along the film edge.



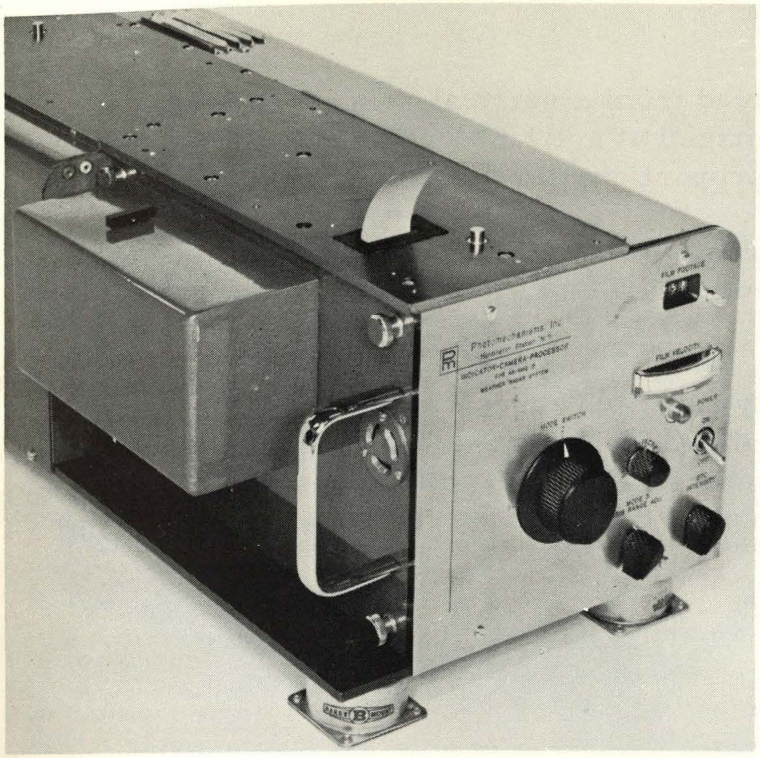
View showing attachment interface to airborne CRT indicator.



Miniature plug-in data chamber imaged on film edge.

© 1963 PHOTOMECHANISMS, INC.

AIRBORNE CAMERA WITH ON-LINE PROCESSOR



- Displays radar returns on CRT
- Photographs successive line scans on moving film
- Processes film and transports image to readout unit

AIRBORNE WEATHER RADAR RECORDER-PROCESSOR

HOW IT WORKS

Returns from side-looking radar are displayed as an intensity modulated, line sweep on a self contained CRT. A lens images successive parallel lines onto 35 mm film moving at a controlled rate. The exposed film is processed in two steps, then dried and fed out of the unit to a scanner for data telemetry.

ENGINEERING CAPABILITIES APPLIED

- Airborne, porous-applicator photoprocessing
- Precision, velocity servo control of film transport
- Servo driven navigation data displays
- Compact packaging of display, recording and photoprocessing components

ADVANCED THE STATE OF THE ART

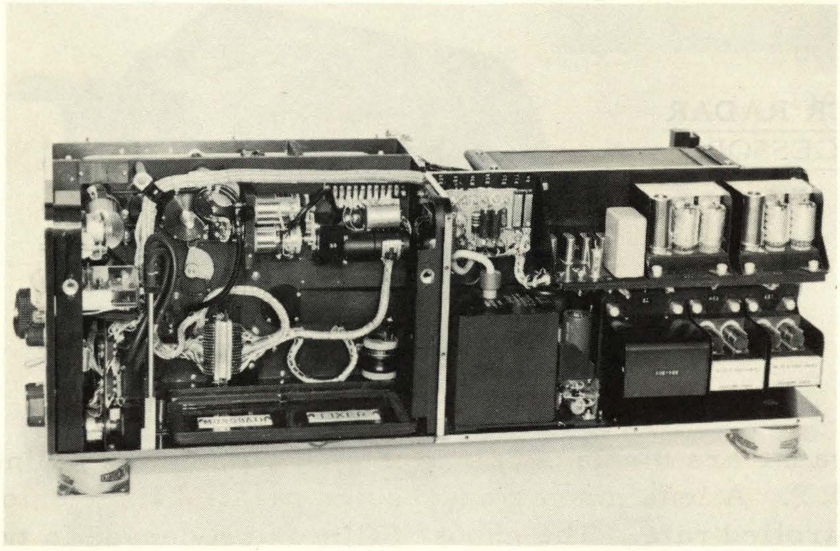
TECHNICAL DATA

A CRT displays information derived from a vertical search above and below the aircraft. The display trace is imaged at a 4:1 reduction onto 35 mm film. The film is servo-driven at a speed proportional to the ground speed of the aircraft.

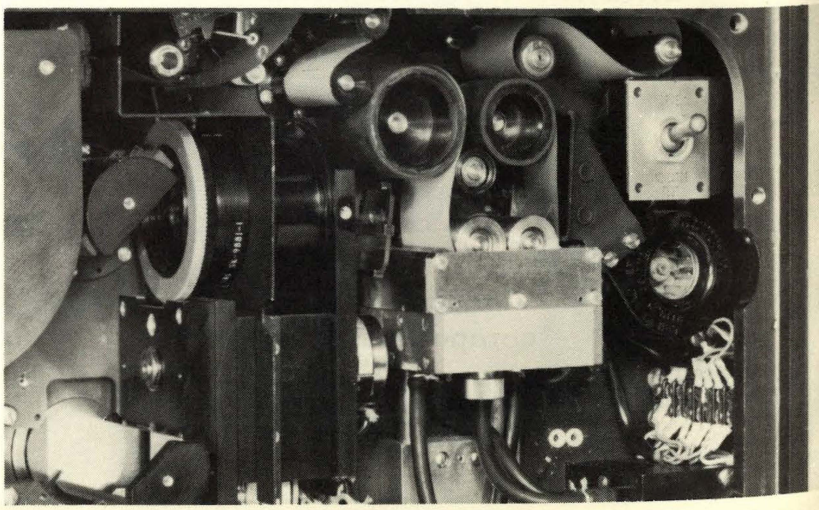
A data display unit permits recording of latitude, longitude, heading, and time data at intervals along the film edge.

Film is processed in a monobath solution, insuring uniform, photographic results over a required 10:1 film velocity range. A second, concentrated solution completes the clearing action of the monobath. Solution is applied by two porous applicators. Processing temperature is 130°F in an unpressurized enclosure. Processed and dried film is delivered continuously for subsequent Vidicon scanning and data transmission.

The unit measures 12x12x24 inches and weighs about 60 lbs.

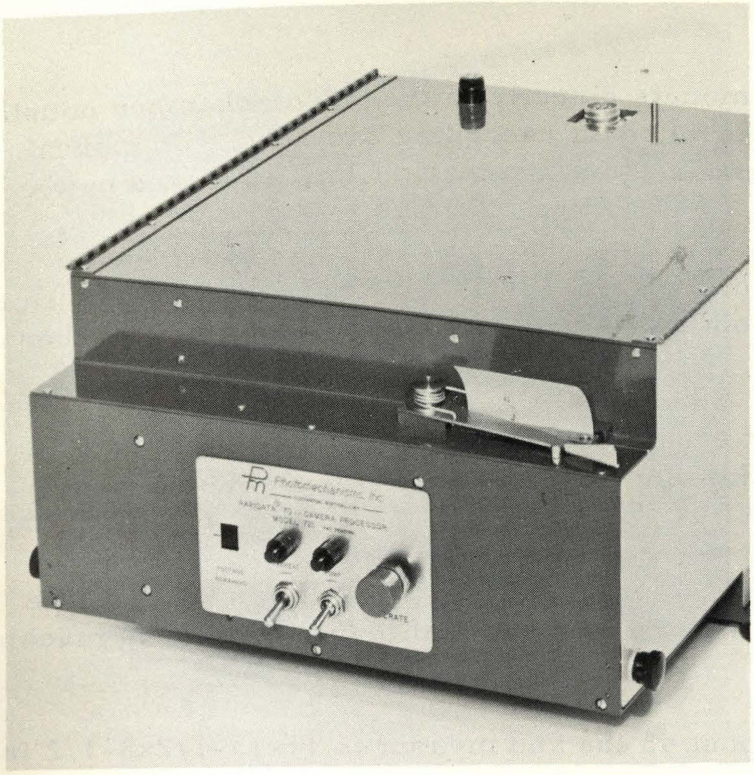


Cover removed showing film drive and servo amplifier assemblies.



Closeup of camera lens and film processing section.

© 1963 PHOTOMECHANISMS, INC.



20 INCH BUBBLE CHAMBER
CAMERA-PROCESSOR

- Photographs particle tracks in liquid hydrogen bubble chamber
- Rapidly processes the film record
- Tests and verifies proper chamber operation in one minute

HOW IT WORKS

70 mm film is precisely located in the focal plane of a lens mounted to the bubble chamber. After each exposure the film is advanced into a storage loop. Exposed film moves continuously through the processor and processed film is extended from the unit to be removed for analysis.

ENGINEERING CAPABILITIES APPLIED

- Simplified, rapid access photoprocessing
- Sensitometric process control, matched to performance of large, conventional, spray processing machine
- Electromechanical design for operation in a high magnetic field

ADVANCED THE STATE OF THE ART

TECHNICAL DATA

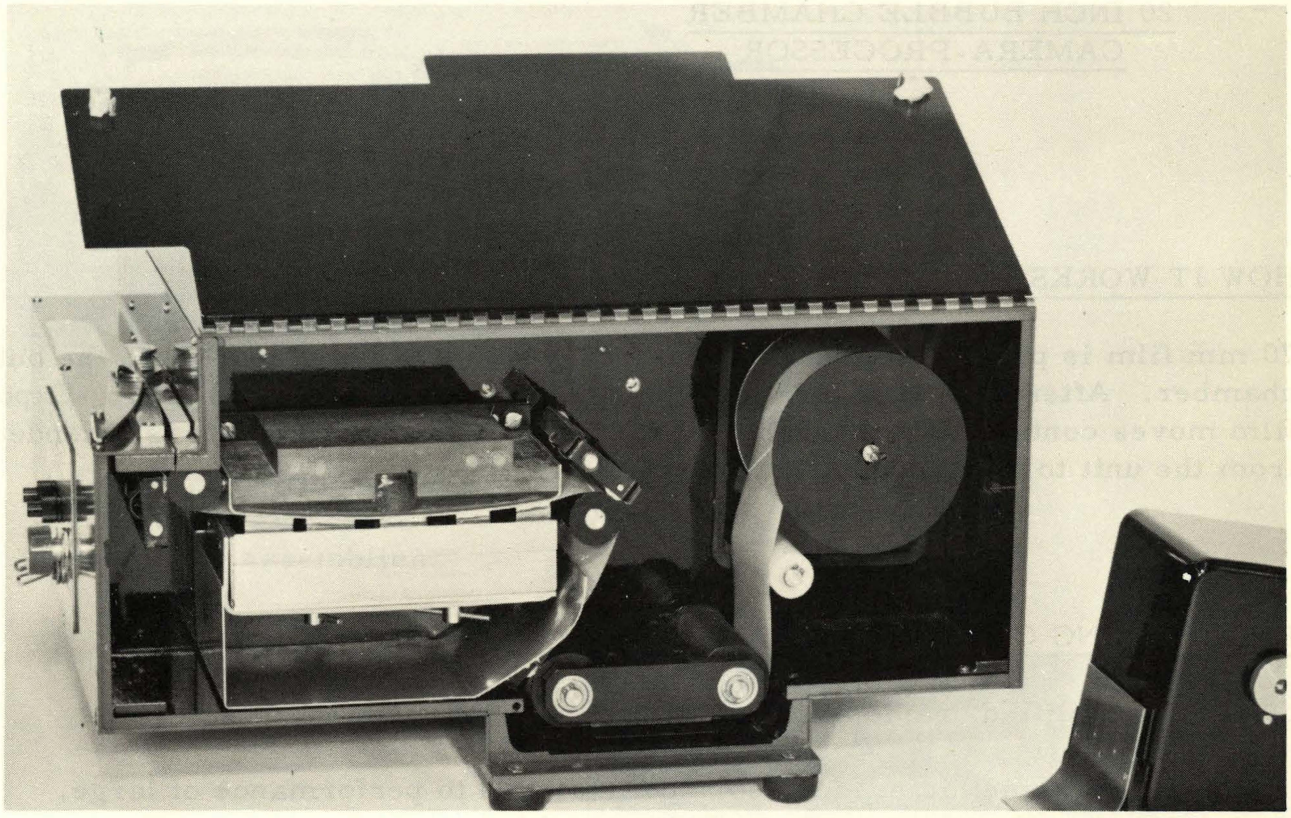
This entirely self contained unit mounts directly to the bubble chamber housing along with the normal non-processing, data recording cameras. On manual command, 1x2 inch frames are exposed on Dacomatic film, triggered by the chamber cycle control.

The camera exposes a sequence of 25 frames which are accumulated in a storage loop to be drawn out by the continuous processor at the rate of 20 inches per minute.

A RAPIDATA® porous-applicator processor develops and stabilizes the film image for immediate analysis. Solutions are drawn from an internal supply which is sufficient to process the full 100 ft. supply of 70 mm film.

The sensitometric performance of the processor is carefully matched to the results obtained with the same film on a conventional high speed spray machine, operated under rigid controls.

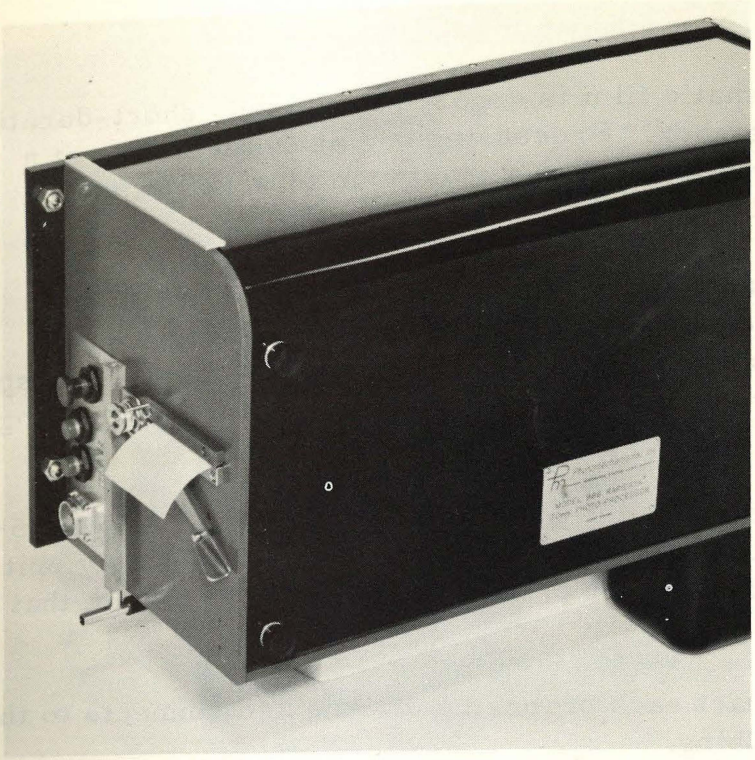
The camera-processor weighs about 45 lbs and measures 17x13-1/2x8-1/2 in.



View with cover open showing complete film path from supply spool, through the exposure and processing stations to the external cut-off knife. The five stage RAPIDATA® processor assembly is shown at left.

© 1963 PHOTOMECHANISMS

ON-LINE
CAMERA-PROCESSOR



- Photographs particle tracks in liquid hydrogen bubble chamber
- Rapidly processes the film record
- Tests and verifies proper chamber operation in one minute

80 in. BUBBLE CHAMBER
CAMERA-PROCESSOR

HOW IT WORKS

70 mm film is precisely located in the focal plane of a lens mounted to the bubble chamber. After each exposure, the film is advanced into a storage loop. Exposed film moves continuously through the processor and processed film is extended from the unit to be removed for analysis.

ENGINEERING CAPABILITIES APPLIED

- Simplified, rapid-access photoprocessing
- Sensitometric process control, matched to performance of large, conventional, spray-processing machine
- Electromechanical design for operation in a high magnetic field

TECHNICAL DATA

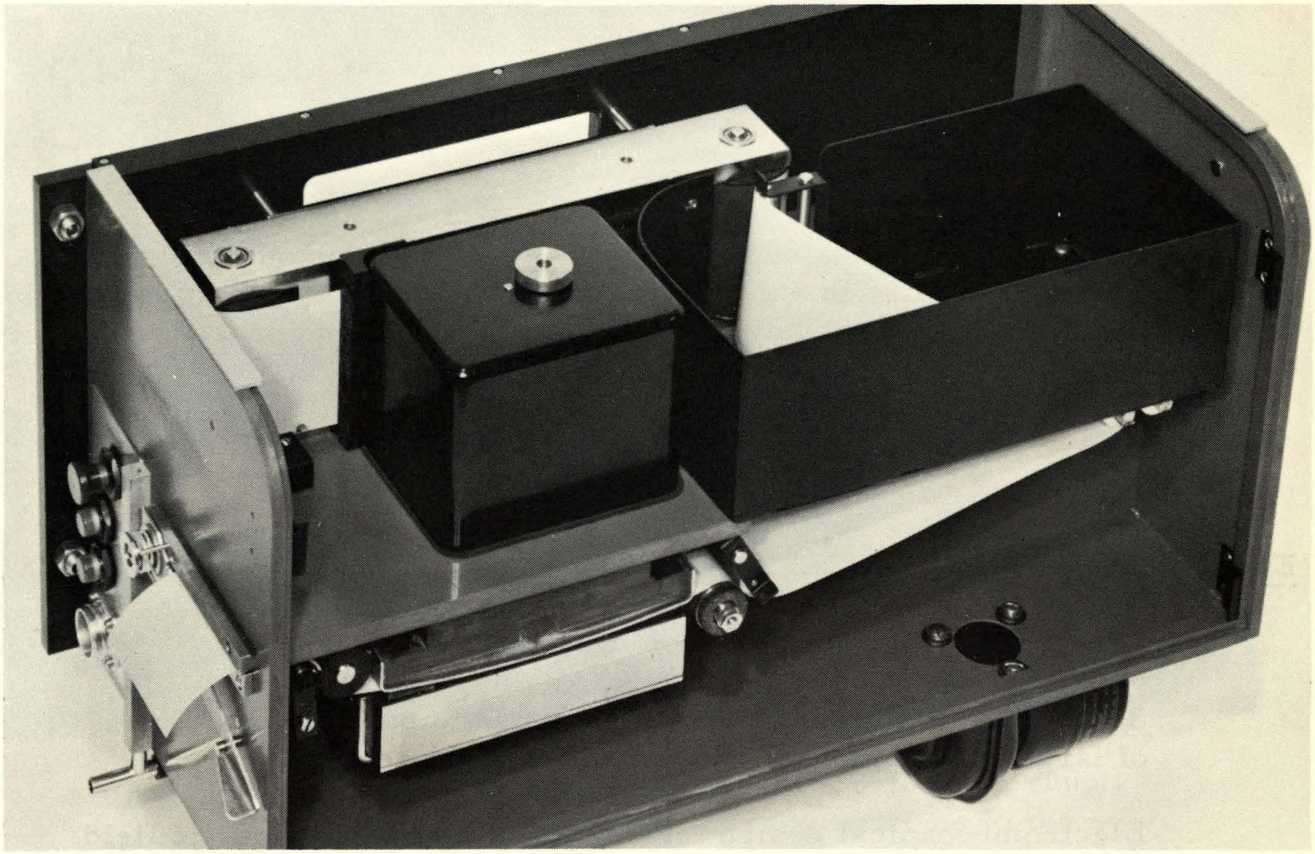
A 2x6 inch area on 70 mm Dacomatic film is exposed by pulsed, short-duration illumination from the bubble chamber. Processing begins immediately at a continuous rate of 20 inches per minute when a maximum of seven exposed frames are accumulated into a loop.

Exposed frames are processed automatically by means of our RAPIDATA® porous-applicator photoprocessor. The sensitometric characteristics are carefully matched to the results obtained on the conventional, high-speed, spray processor used to process the results from the battery of chamber recording cameras.

The camera-processor is in two assemblies. The main assembly weighs 35 lbs and mounts directly to the bubble chamber housing. The solution supply unit is separate and provides ample solutions for processing the 100 ft. of film that the camera holds.

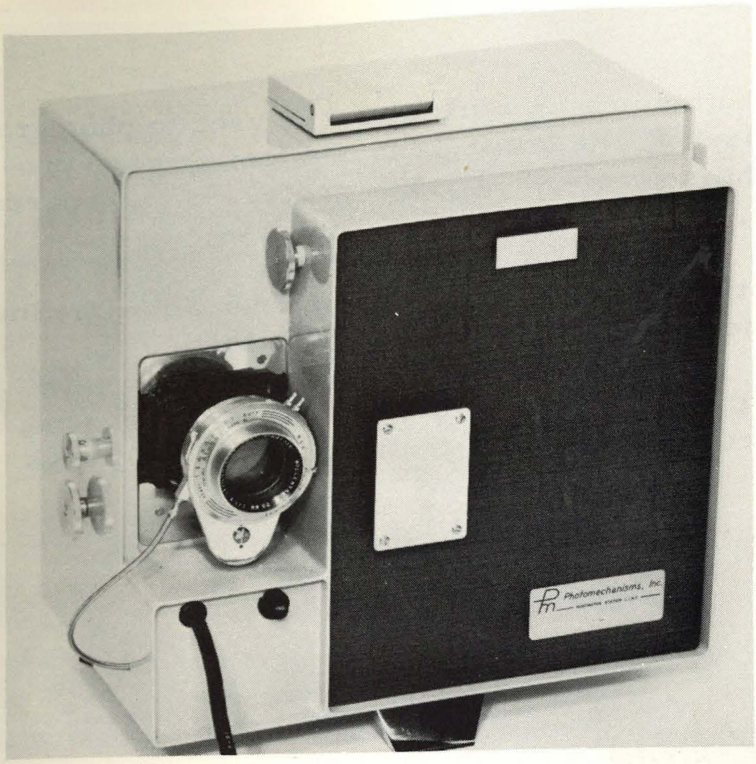
The solution supply holds one quart each of three solutions and connects to the main assembly by a cable and tubing.

Film is processed to a gamma of 2.4 with a develop-stabilize-rinse process allowing examination of images without further treatment.



Interior of camera-processor showing film path transition from vertical exposure gate to horizontal RAPIDATA® processor at lower left.

© 1963 PHOTOMECHANISMS, INC.



RAPROJECTOR

- Photographs data display
- Processes film
- Projects image in 5 seconds

HOW IT WORKS

35 mm film is exposed by a camera lens and immediately pulled through a two-step processor into a projection gate. High temperature, accelerated processing gives rapid access to recorded data.

ENGINEERING CAPABILITIES APPLIED

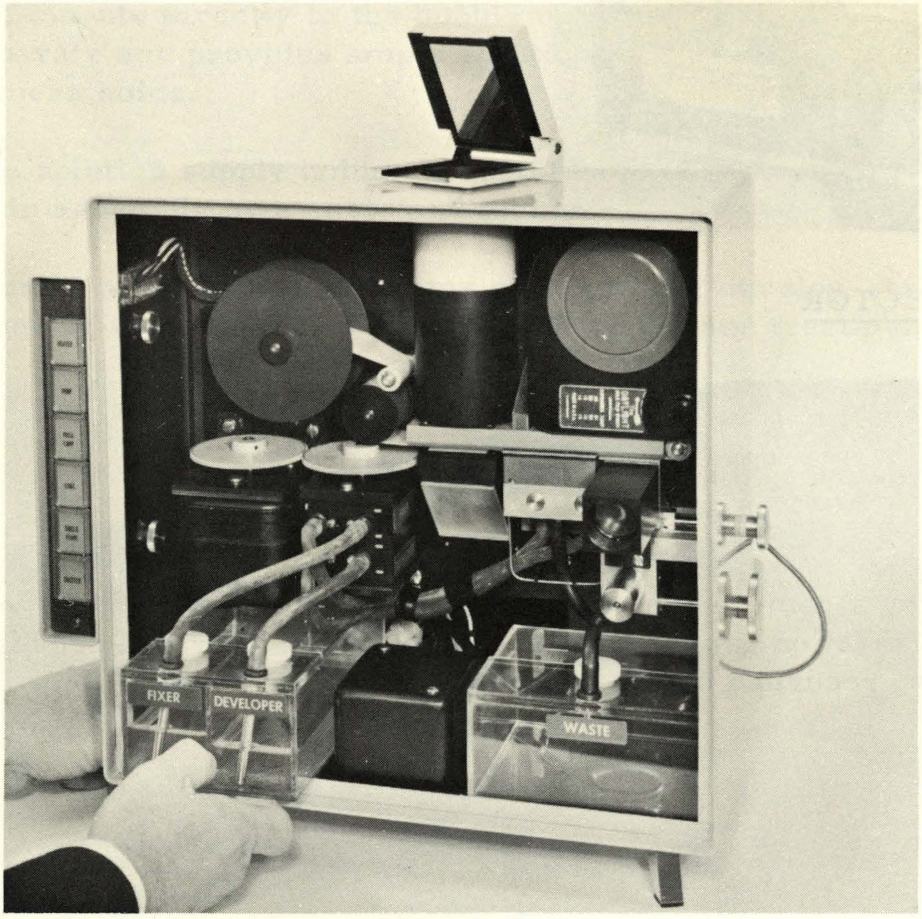
- Close coupling of recording, processing, and display stations to speed access to data
- High temperature processing to reduce development time
- Chemical stabilization of image for immediate projection

TECHNICAL DATA

A standard, 3 inch lens with a shutter in a focusing mount is used to photograph any suitable fixed or transient display. Reflex viewing and focusing are provided. A two-step, develop-stabilize process at 130°F processes thin, hardened emulsion films in 3 to 5 seconds.

A 5 inch projection lens in a vertical axis and a movable mirror allow the image to be projected at any angle. The unit contains its own chemicals.

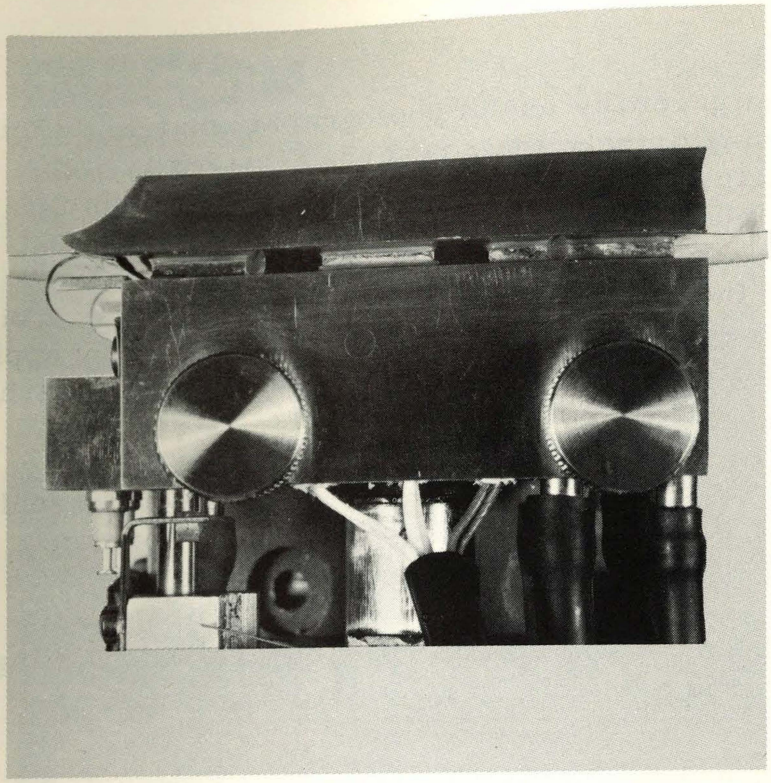
The RAPROJECTOR may be used as a continuous or single frame recording device. Processing is always accomplished with continuous motion through the processor section.



Interior view showing compact optical and rapid processing systems. Exposure and projection stations are separated by only four inches on center.

SIMPLIFIED PHOTOPROCESSING

- Film moves continuously
- Heated fluids are applied to film emulsion
- Image developed and fixed in a minimum of five seconds
- Fresh solutions constantly supplied



RAPIDATA® PHOTOPROCESSOR
USING POROUS APPLICATORS

HOW IT WORKS

Heated solutions are metered by a simple feed pump through a porous applicator surface held close to the emulsion side of the film. The processing solutions fill the gap between the applicators and film. Rapid image processing occurrs while the film is drawn through the heated solutions over a stationary, heated backup plate.

ENGINEERING CAPABILITIES APPLIED

- Fluid dynamics - single side fluid application
- Thermodynamics
- Photographic chemistry for high temperature processing
- Matching of film, chemistry and application technique for maximum results in specific requirements
- Use, only, of fresh solutions for processing
- Precise sensitometric processing control
- Simple, dependable mechanisms - no valves, seals orifices or vacuum pumps required

ADVANCED THE STATE OF THE ART

TECHNICAL DATA

Silver halide emulsions, the most generally useful photographic materials today, require aqueous solution processing to make their recorded images visible. This requisite processing step helps achieve the tremendous photographic emulsion speeds of silver halide photography.

Traditionally, though, the use of these conventional materials for the recording and utilization of data of many types is made fairly unattractive for many applications because of the inconvenience of the necessary develop-rinse-fix-wash-dry processing steps.

Obviously a method for fast, convenient, automatic processing of photographic emulsions would notably increase the usefulness of such materials for data handling. RAPIDATA® Photoprocessors have been developed to provide such a method.*

* A technical discussion of the theory of RAPIDATA® processors and a listing of materials which may be processed is available on request.

Photographic processing speed is dependent on several factors. The ultimate in speed might be said to result from the use of high energy solutions, at high temperatures and flow rates on a very low speed, very thin photographic emulsion.

RAPIDATA® Photoprocessors make use of high temperature, high energy solutions. Because of the elemental simplicity of the system, many types of films may be processed, including unhardened, high speed emulsions.

Seven years of research and development have gone into RAPIDATA® photoprocessors, backed up by over twenty years' of continuous investigation in accelerated processing. They have been, or are now being, manufactured for the following applications:

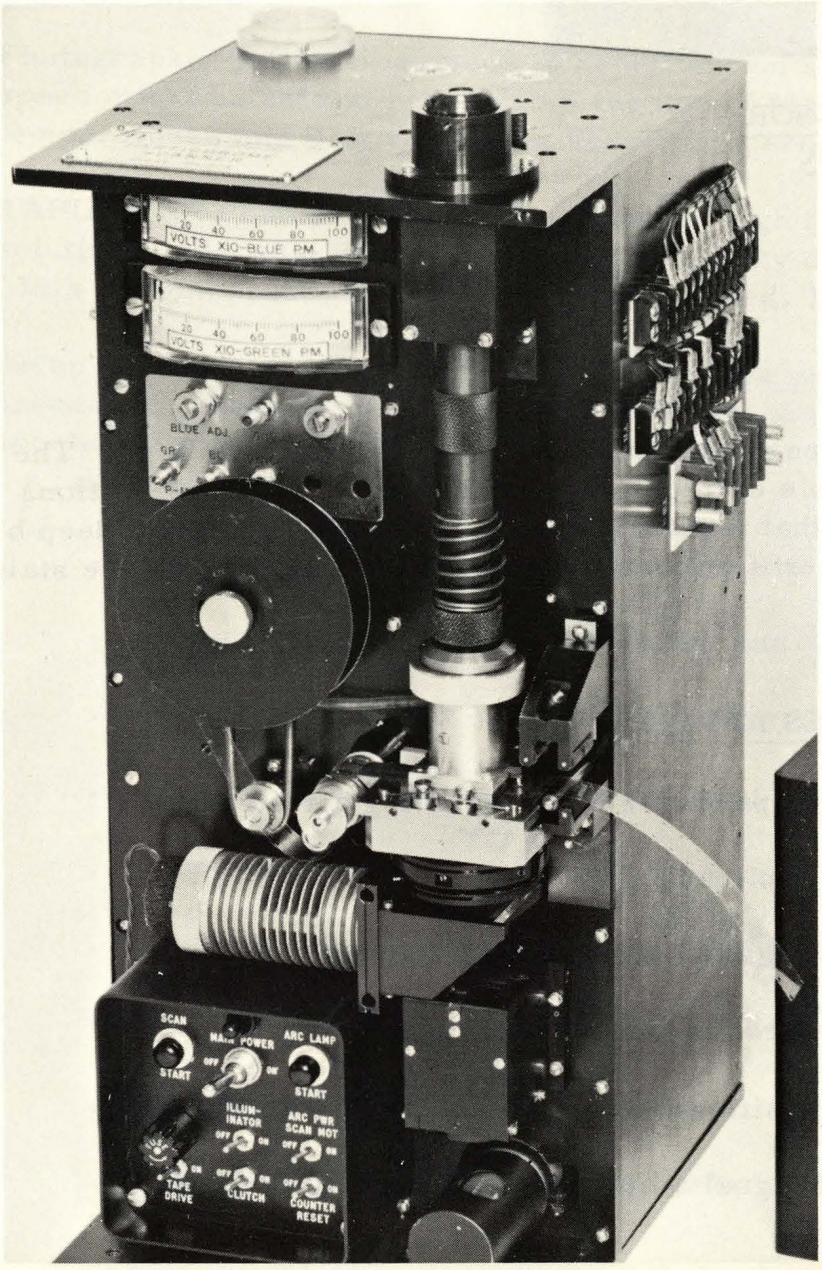
- Camera-processor-viewer for satellite telemetered data
- 70 mm processor for telemetered data
- Camera-processor-projector for transient data recording
- Camera-processor-scanner for input to digital computer
- Camera-processor-projector for digital computer output
- Airborne side-looking radar recorder-viewer
- 16 and 35 mm processor for data recording films
- 16 mm processor for microfilm
- Camera-processor for bubble chamber monitoring

© 1963 PHOTOMECHANISMS, IN

TECHNICAL DATA

A sample is collected over a predetermined time interval by directing a jet of ambient air against an oiled tape. Particles under 5 microns in size adhere to the tape and are treated with chemicals applied by small evacuated cups, lip-sealed against the tape. Chemical solutions are sequentially applied at elevated temperatures with rotary valve selection. The tape is moved in steps between applicator cups. The protein matter (bacteria) is stained blue by the dye, while non-proteins are unaffected.

The treated sample is drawn at uniform speed through a microscanner. A spot of intense illumination, one micron in diameter, scans in a circular path over the moving tape. Blue light is transmitted when the spot intersects a stained particle; white light for a neutral particle. Selectively filtered photoreceptors distinguish between blue and neutral particles. Resultant signals are amplified, pulse-shaped, discriminated, compared in time for coincidence and counted. Predetermining scalers indicate when preset level is exceeded.

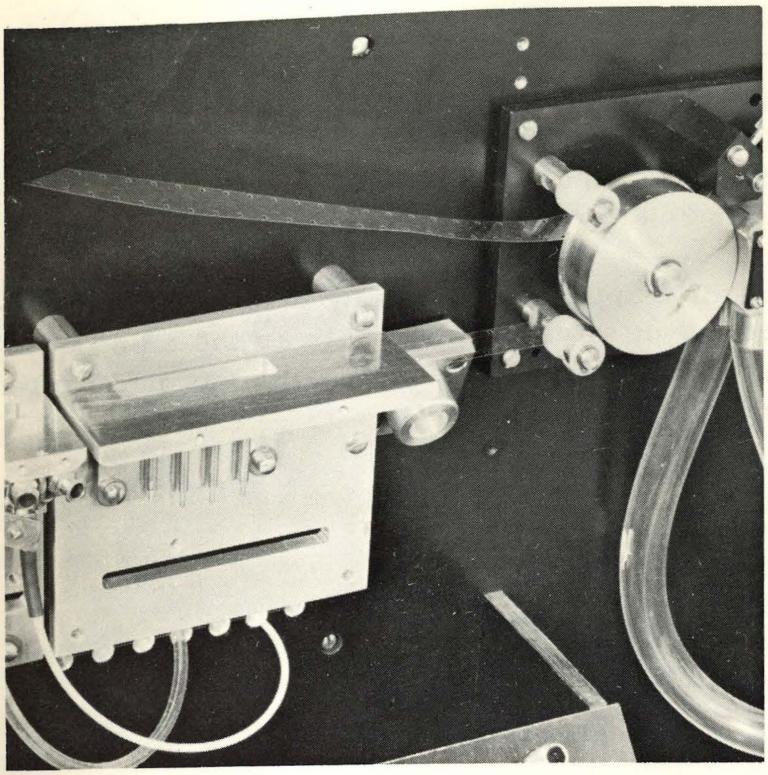


Visual observation of scanned particles through eyepiece at top.

Stained tape samples enter microscanner at left.

Color filtered photomultiplier outputs compared in external electric circuitry.

SPECIMEN PREPARATION SYSTEM



- Collects samples from air on moving tape
- Chemically treats sample to selectively stain bacteria

BIOLOGICAL SPECIMEN PROCESSOR

HOW IT WORKS

Particles suspended in air are caught by impact on moving transparent tape. The sample is fixed, treated, stained, and destained while the tape is in motion, using meniscus application of fluids.

ENGINEERING CAPABILITIES APPLIED

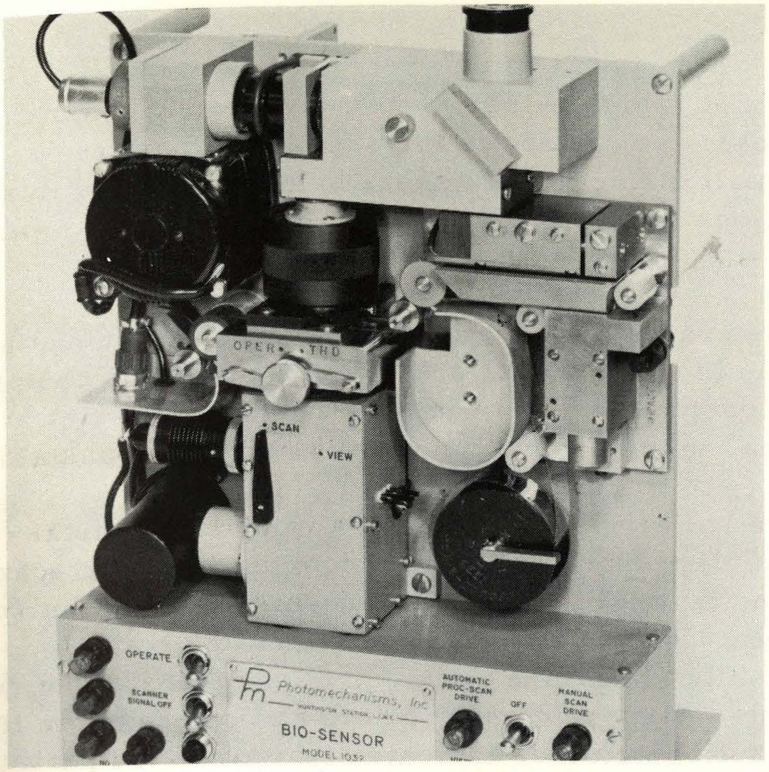
- Entrapment of particles suspended in a moving air stream on a moving surface
- Limited area liquid application on a moving tape
- Liquid application without applicator contact
- Thermal stabilization and control of moving fluids
- Materials selection for handling of hostile fluids

TECHNICAL DATA

The sample is collected by directing a high velocity jet of air against moving, oiled, transparent, tape. Chemicals are applied to the sample by forming stationary droplets from small diameter feed tubes held close to the moving tape. The slight excess of solutions is drawn off by evacuated waste tubes.

Solutions are pumped through the small applicator tubes by piston displacement. The sample is sequentially treated by the various chemicals as the tape is drawn through the droplets. The result of the treatment is blue stained bacteria, with non-protein matter unstained.

© 1963 PHOTOMECHANISMS, I



- Collects samples from air on moving transparent tape
- Chemically treats sample to selectively stain bacteria
- Photo-optically detects a single stained particle
- Alerts operator for visual analysis of detected particle

BIOLOGICAL PARTICLE DETECTOR

HOW IT WORKS

Collects particles from ambient air sample on moving tape. Particles are fixed and chemically treated to selectively stain bacteria a deep blue. The stained sample is searched with a micro-optical scanner which automatically indicates the presence of a stained particle.

ENGINEERING CAPABILITIES APPLIED

- Entrapment of particles suspended in a moving air stream on a moving surface
- Limited area liquid application on moving tape
- Materials selection for handling of hostile liquids
- Microimagery to produce bright scanning spot
- Maintaining minute positional tolerances of moving tape surface
- Signal amplifiers and dynamic, high-pass filter networks to distinguish single, stained-particle pulses

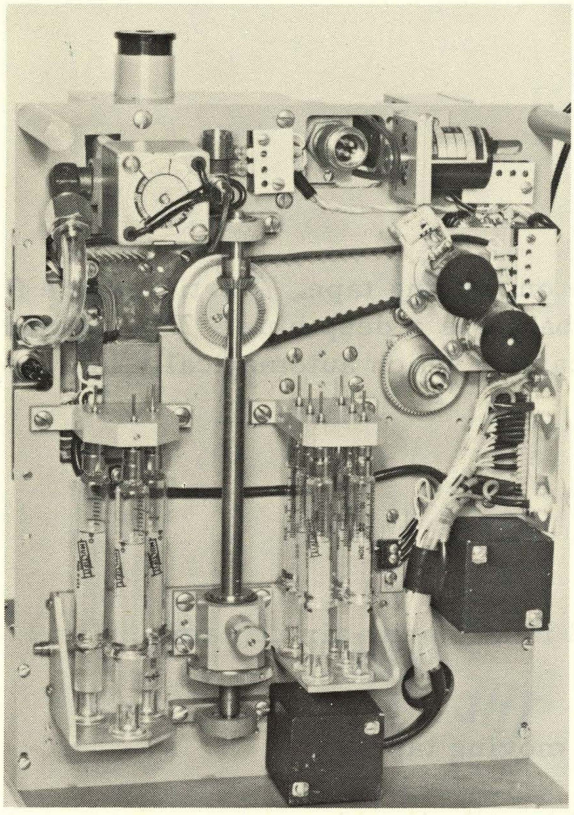
ADVANCED THE STATE OF THE ART

TECHNICAL DATA

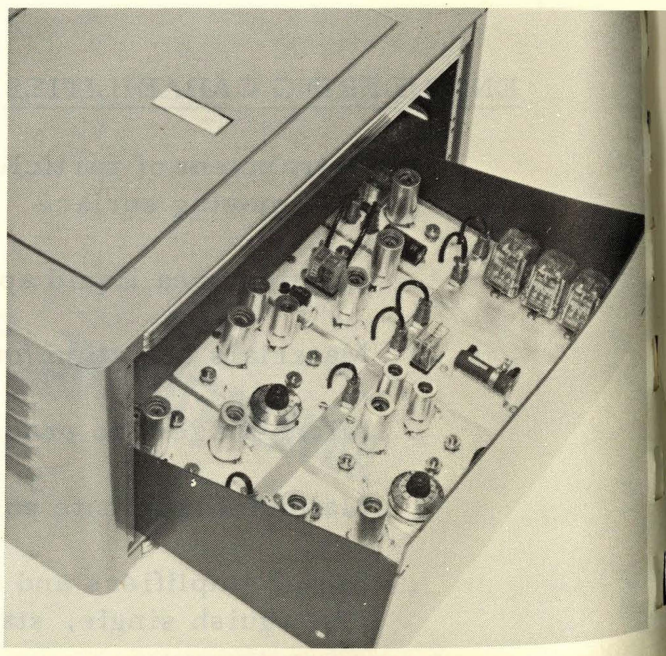
The sample is collected by directing a high velocity jet of air against a moving, oiled, transparent tape. Chemicals are applied to the sample by forming stationary droplets from very small diameter feed tubes held close to the moving tape. The slight excess of solutions is drawn off through small evacuated waste tubes.

Solutions are pumped at controlled rates through the applicator tubes by syringe piston displacement. The sample is sequentially treated by the various chemicals as the tape is drawn through the droplets. The chemical treatment results in the selective blue staining of bacteria, with non-protein matter remaining unstained.

The treated sample is moved at a uniform speed through a miniature optical micro-scanner. A spot of intense illumination three microns in diameter scans in a circular path over the moving tape. Blue light is transmitted when the spot intersects a stained particle; white light for a neutral particle. Selectively filtered photoreceptors distinguish between blue and neutral particles. The resultant signals are amplified, pulse shaped, discriminated and compared in time for coincidence. A condition of anticoincidence indicates that a stained particle has been sensed. The unit stops and turns on an operator-call signal.



Rear view showing solution syringe, optical and tape drive mechanisms.



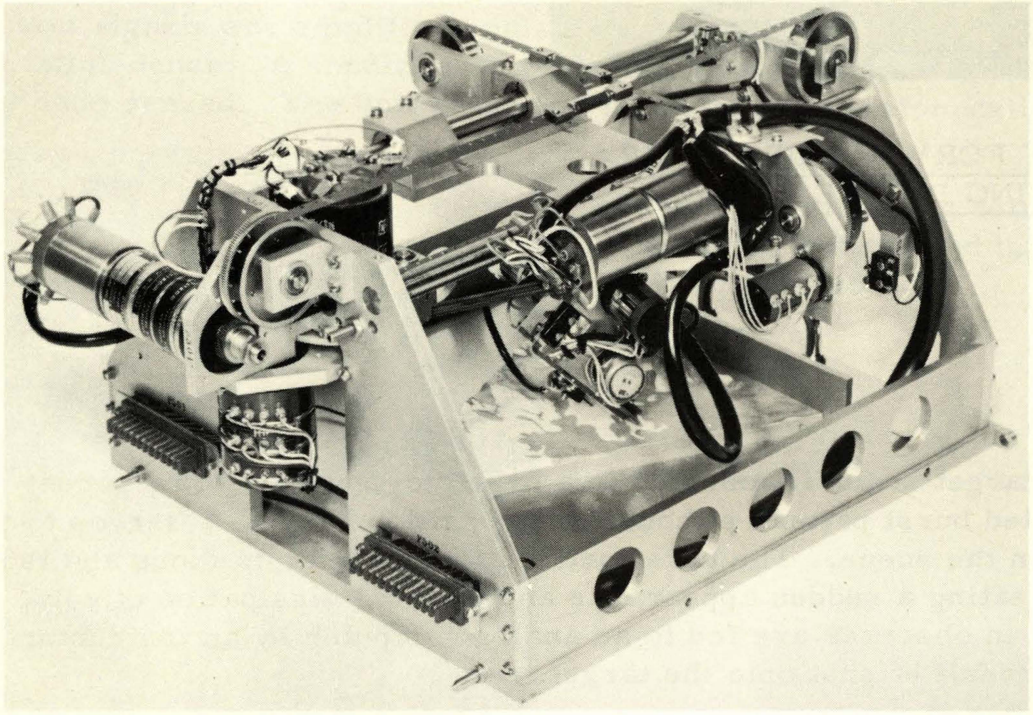
Electronic drawer containing pulse shaping and discriminating circuits.

© 1963 PHOTOMECHANISMS, INC.

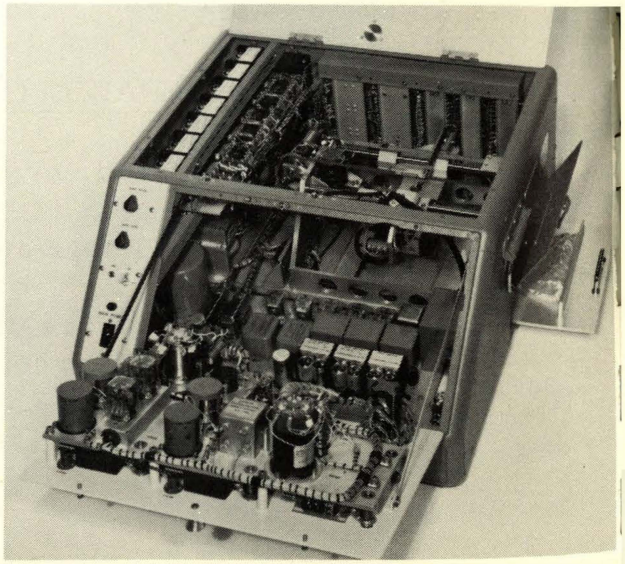
TECHNICAL DATA

A 1000 watt projection system fills an 8x16 foot screen with a terrain scene. The target may be selected at any position within a large area on the screen. Target coordinates are estimated by the student from map reference. Estimated coordinates are set into the computer by an instructor. A three-dimensional terrain model introduces actual elevation at burst point. A sound system generates burst sound with proper timing. An auxiliary optical system generates lighter-than-background burst effects, such as smoke and dust. Provision is made for fuze type selection, and for single, double, or six gun salvos.

The system requires a 40 ft. long classroom and can train 15 to 20 students at a time in the elements of forward observation. One student works the problem with dummy binoculars, while others follow the action with the aid of the instructor's polarized projection pointer which is invisible to the student using the binoculars. Training is aided by realistic burst effects which are different for air, ground or defiladed types.

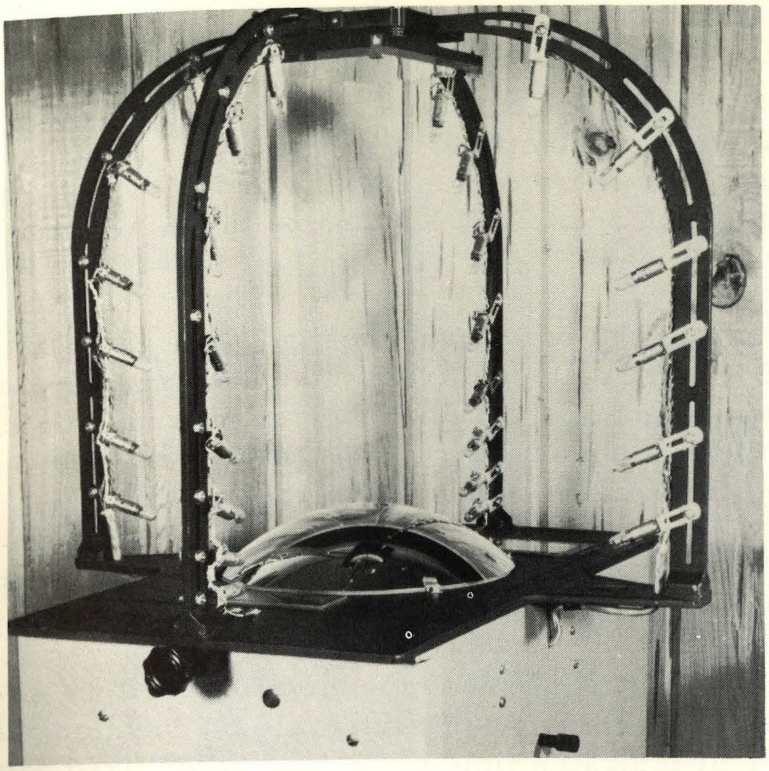


X-Y servo subassembly which provides accurate position information from a terrain model.



Main computer with console tilted forward, terrain model at rear.

© 1963 PHOTOMECHANISMS, INC.



ALL-SKY CAMERA

- Photographs entire sky in one exposure
- Operates on automatic sequence
- Records time and identifying data
- Pictures include azimuth and elevation references

HOW IT WORKS

A 16 mm cine camera, modified for pulsed time exposure operation, photographs the sky image from a convex spherical mirror. A binary data display unit, operated from internal timers and manually set controls, is recorded on each film frame.

ENGINEERING CAPABILITIES APPLIED

- Wide angle reflecting optics
- Time lapse photography
- Internal environmental control
- Maintenance of performance of exposed optical elements

TECHNICAL DATA

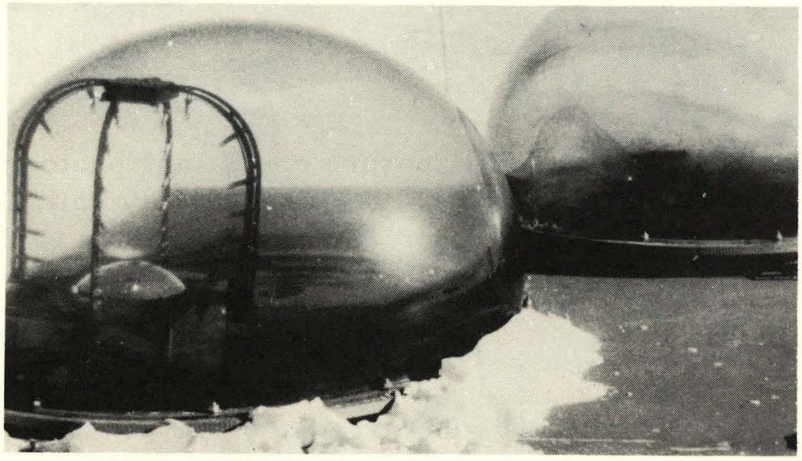
The All-Sky Camera is designed for operation outdoors in arctic temperatures. It contains internal heaters to maintain all components in a proper operating temperature range. While the unit is intended for use with a protective plastic dome, it has been used unprotected with accessory heaters on the mirrors to prevent condensation of water or ice.

The reflecting optical system is based on a Stoffringen design. The camera lens axis is vertical, oriented upward. Light collected from the entire sky is reflected upward from a horizontal segment of a convex spherical mirror to a small plane mirror and then downward from the plane mirror to the camera lens through a small clear hole in the center of the spherical mirror.

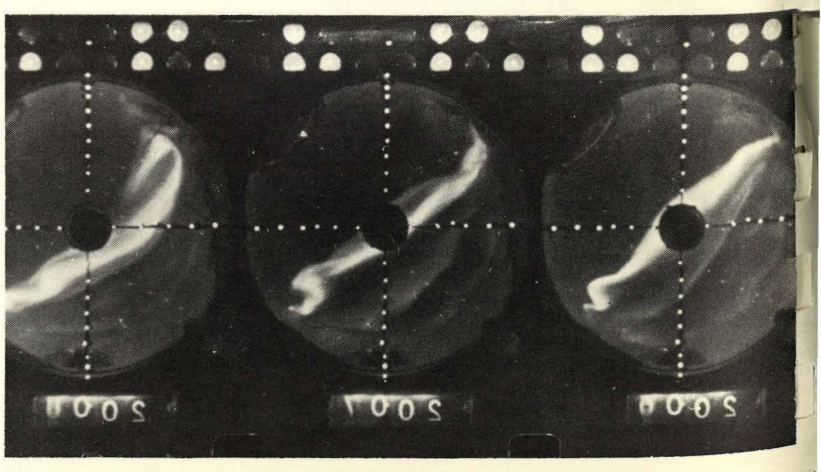
Azimuth and elevation reference marks are recorded on the film by small lights located on the supporting framework for the plane mirror.

The camera is a commercial 16 mm motion picture type modified for long-life, pulsed operation. Internal timers program exposure interval and duration. An alphanumeric and binary display unit indicates time of day and other fixed data for identification of each film frame

The All-Sky Cameras were developed for, and used during and since the International Geophysical Year, for study of aurora, clouds and meteorological effects.



All Sky Camera in the Antarctic under a protective plastic dome.



Striking aurora displays photographed at one minute intervals.

© 1963 PHOTOMECHANISMS, INC.

HIGH SPEED AERIAL FILM TITLER

AERIAL RECONNAISSANCE FILM TITLER

- Reads binary frame identity code on film
- Searches for and reads out corresponding magnetic tape data
- Titles each frame from CRT data at up to 200 characters/second

HOW IT WORKS

Processed 35 mm, 70 mm or 9-1/2 inch aerial reconnaissance film is automatically related frame-by-frame to data recorded on magnetic tape. Data read out from tape to a buffer storage is displayed on a CRT and continuously printed on the film in alphanumeric form by Xerography.

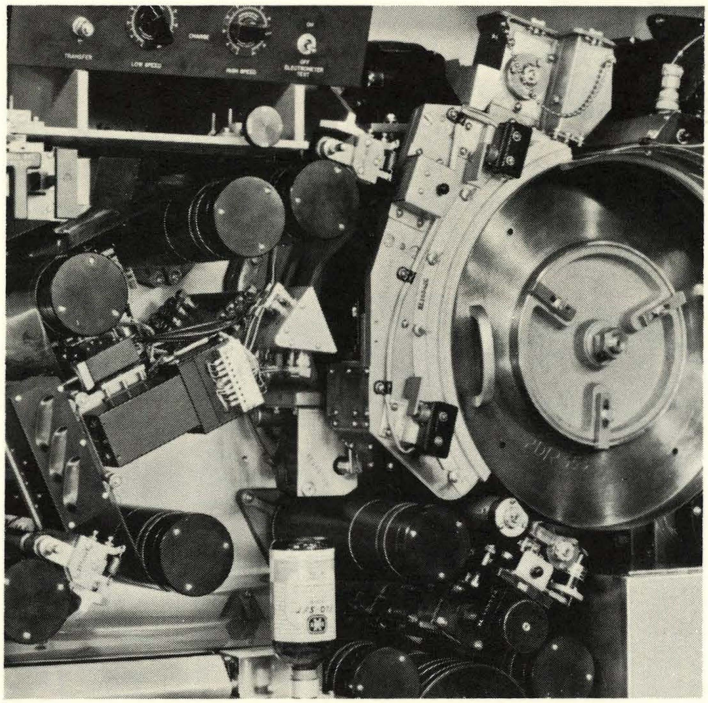
ENGINEERING CAPABILITIES APPLIED

- Photoelectric binary data readout
- Integration of a Xerographic printer into a film handling system
- Precise servo position control of optical and Xerographic systems

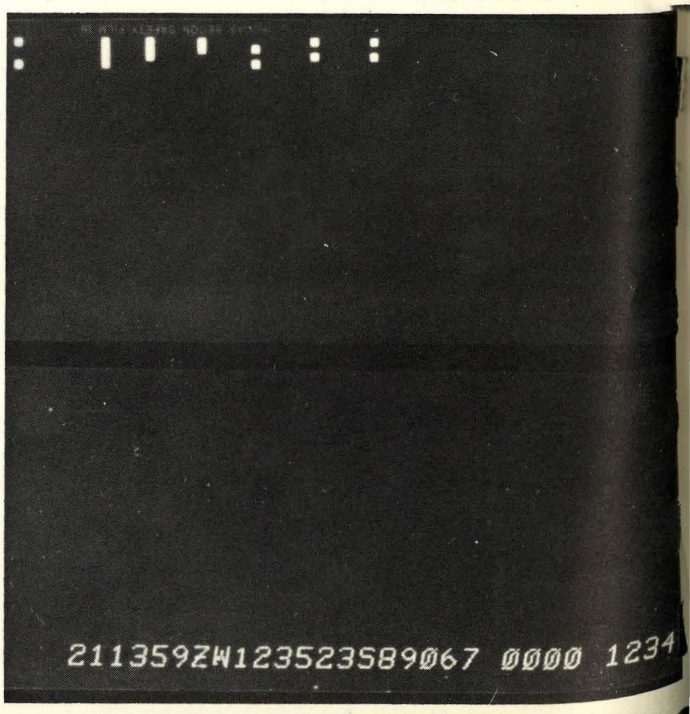
TECHNICAL DATA

Binary code data exposed in the aircraft is read photoelectrically from processed film which is driven continuously at a maximum rate of 25 ft/minute. Associated electronic equipment searches for the corresponding block of dynamic data recorded on magnetic tape. This data, consisting of latitude, longitude, altitude, mission type etc., is stored as binary bits and read out as alphanumeric characters in 7x10 matrix dot form. The matrix data is displayed on a CRT which is imaged onto the drum of a Xerographic printer. The toner image subsequently formed is transferred to the appropriate film frame and vapor-fused for permanence.

To achieve the stringent tolerance requirement of .005 inch for data reading and printing locations, an unusual servo-following technique was used. Instead of guiding the 9-1/2 inch film, the titler sensed and followed the film edge through the entire reading and printing mechanisms.

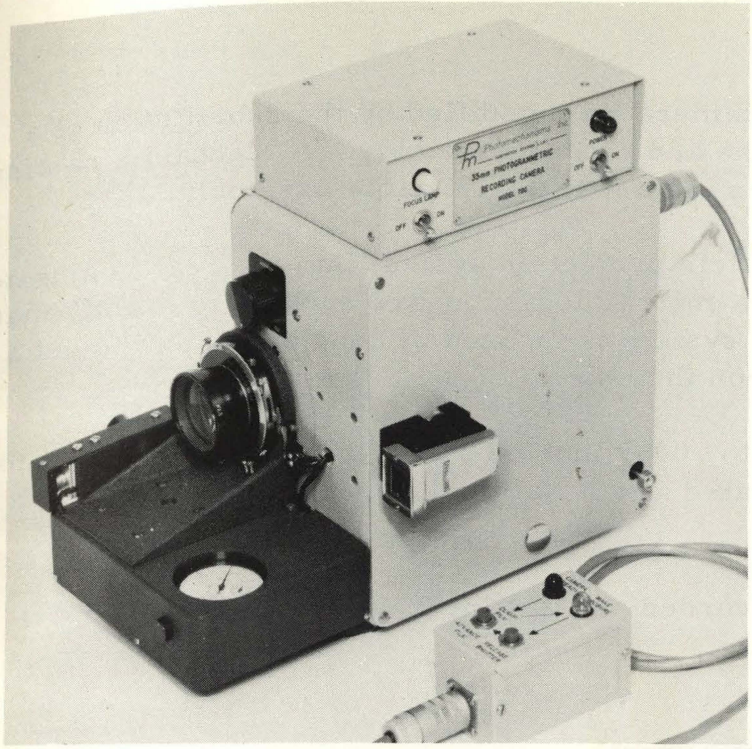


Closeup of film transport section showing binary code reading at the left and a Xerographic character printing system on the right.



Contact print of sections of a 9-1/2 inch wide titled aerial reconnaissance film.

© 1963 PHOTOMECHANISMS, INC.



PRECISION 35 mm PHOTOGRAMMETRIC
CAMERA

- Projects test target image onto object for focus and aiming
- Indicates precise distance of lens from film plane
- Takes high resolution, calibrated, low distortion 35 mm pictures

HOW IT WORKS

A movable mirror behind the lens allows a resolution chart to be projected on the object and accurately focused by the taking lens. A dial indicator shows lens-to-focal plane distance. Fiducial marks recorded on the film are used to calibrate the image.

ENGINEERING CAPABILITIES APPLIED

- Precision mounting of a high resolution lens
- Vacuum flattening of film in a plane precisely normal to lens axis
- Accurate indication of lens movement from infinity focus
- Precision duplication of film plane with a transmission reticle.

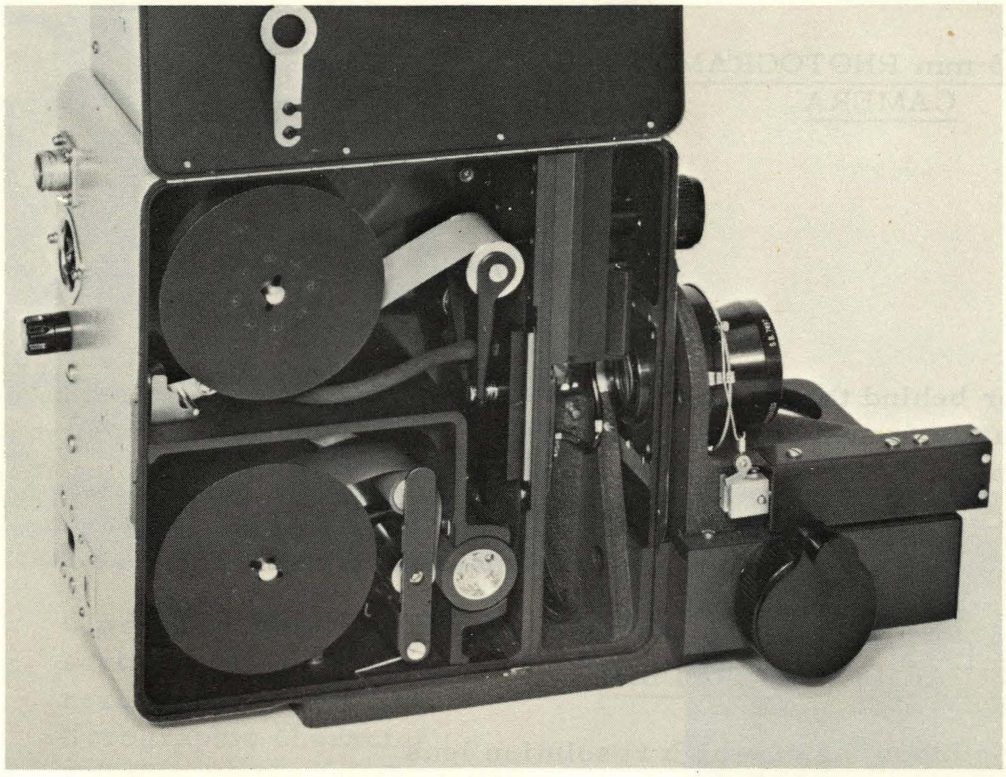
TECHNICAL DATA

A standard planetary microfilm camera was modified by the substitution of a specially designed lens, film plane and reticle assembly. A Meehanite casting was designed to hold lens and film in an extremely stable assembly.

A sliding mirror introduces a reticle projection system into the rear conjugate of the objective lens. The reticle-mirror locations are such as to exactly match the film and reticle planes. The system is focused by lens movement to get a sharp resolution chart projected on the object.

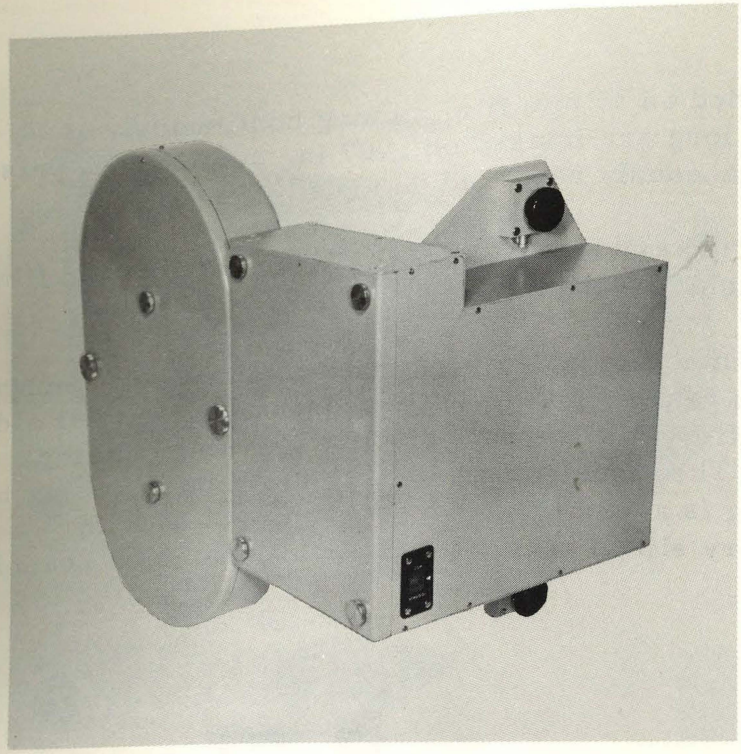
The lens axial position is shown to .0001 inch on a dial indicator. The lens focal length and distortion were calibrated at the National Bureau of Standards.

Fiducial reference marks are recorded on the film from small illuminated targets recessed into the film gate.



Camera with cover open showing the precision lens mount integrated into the camera body.

© 1963 PHOTOMECHANISMS, INC



- Records single-channel, sequential analog data
- Plays back recorded information at 1/20th recorded rate

PHOTOGRAPHIC DATA RECORDING
AND PLAYBACK SYSTEM

HOW IT WORKS

An airborne camera using continuously moving 35 mm film photographs transversely oriented data lines from two alternately excited CRT's. Data recorded as density variations in the transverse lines is then read out by a separate, synchronous, flying-spot scanner unit.

ENGINEERING CAPABILITIES APPLIED

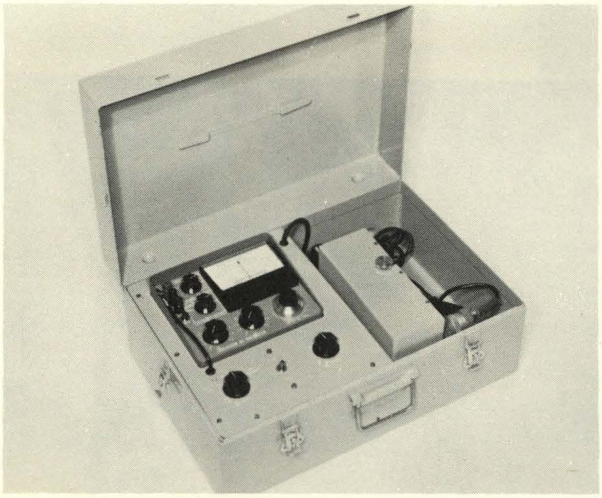
- Time sharing of high frequency signal channels to generate a continuous record
- Precision image formation and location utilizing high quality optics
- Velocity-error correction through servo control
- High brightness, linear, optical scanning using optical-mechanical principles

TECHNICAL DATA

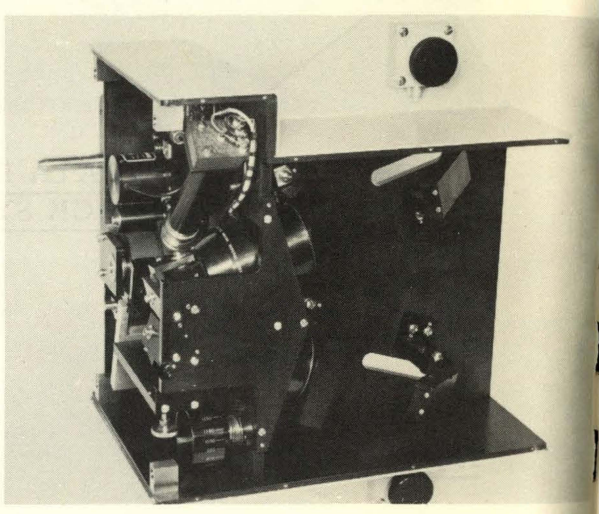
A two megacycle signal is recorded on 35 mm film moving continuously at 14 in./second. Data lines one inch long are imaged on .007 in. centers. A pulsed time reference channel is simultaneously recorded on the film edge.

Optics are high resolution requiring extremely critical alignment, and the film is driven continuously by a precision mechanism.

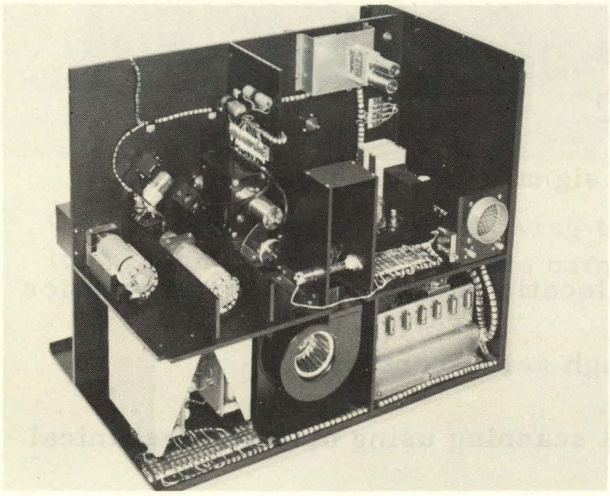
The readout unit uses an optical-mechanical flying spot scanner with a synchronous drive at 1/20th the recording rate. Photoelectric sensors with optical aids generate an error signal for a differential correction servo which keeps the scanning spot on the data lines. The signal generated by the readout system has a 20 db dynamic range. Scanning is accomplished by a rotating disc with involute slits crossing a stationary slit to generate a .001 in. diameter scanning spot.



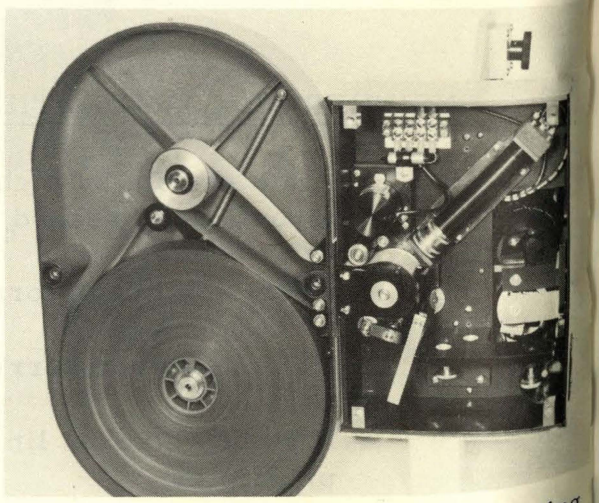
Alignment fixture used in setting up the airborne camera system.



Closeup of the CRT imagery system.



Rear view of readout unit.



Interior of airborne camera showing 1,000 ft. space-sharing film cassette.

© 1963 PHOTOMECHANISMS, IN

- Functionally tests radar recording camera
- Permits focus and alignment of CRT display
- Establishes CRT brightness
- Verifies camera pulldown operation and binary data display performance

FUNCTIONAL TEST UNIT

HOW IT WORKS

The unit substitutes for the camera magazine and permits observation of the main camera lens and data display lens images under magnification. The images are compared with a ruled glass reticle and corrections made to bring them within tolerances. A visual photometer establishes proper CRT trace brightness for photography.

ENGINEERING CAPABILITIES APPLIED

- Precision location of critical elements in a removable assembly through kinematic design
- Multipurpose optical system design using movable elements
- Area integration to permit photometry of a moving CRT trace
- Precision optical image location and visual photometry

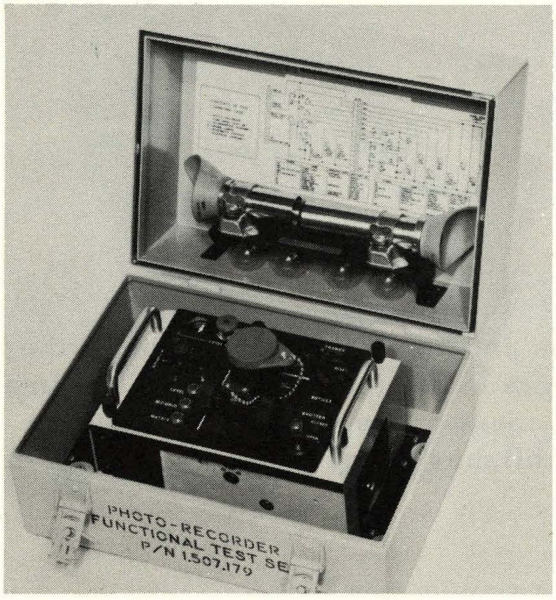
TECHNICAL DATA

The fixture is mounted to the camera in place of the film magazine. The unit and the glass reticle are kinematically located in their proper positions by the machined reference surfaces of the camera body.

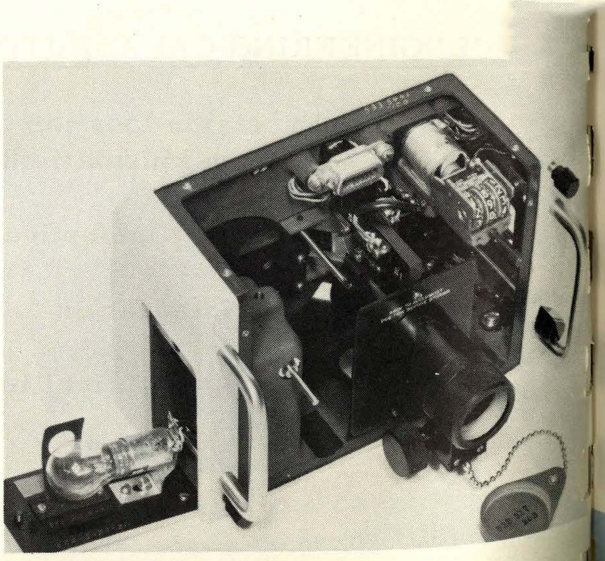
A convertible optical system permits a close visual scrutiny of the camera image under 8X magnification or, by moving a lever which repositions some of the lenses, an accurate adjustment of the CRT trace brightness for optimum exposure on the film during recording. By comparison of the camera image with reticle rulings and observation of indicator lights and CRT image, a general functional check of the camera is made. The CRT spot focus and sweep magnitude and linearity can be properly trimmed.

The photometer employs a split concentric field using a calibrated tungsten lamp as a brightness reference. The test area is uniformly illuminated by the moving CRT test pattern through use of an integrating optical system.

The film pulldown claw in the camera engages a mechanical counter which permits testing of the film drive mechanism.



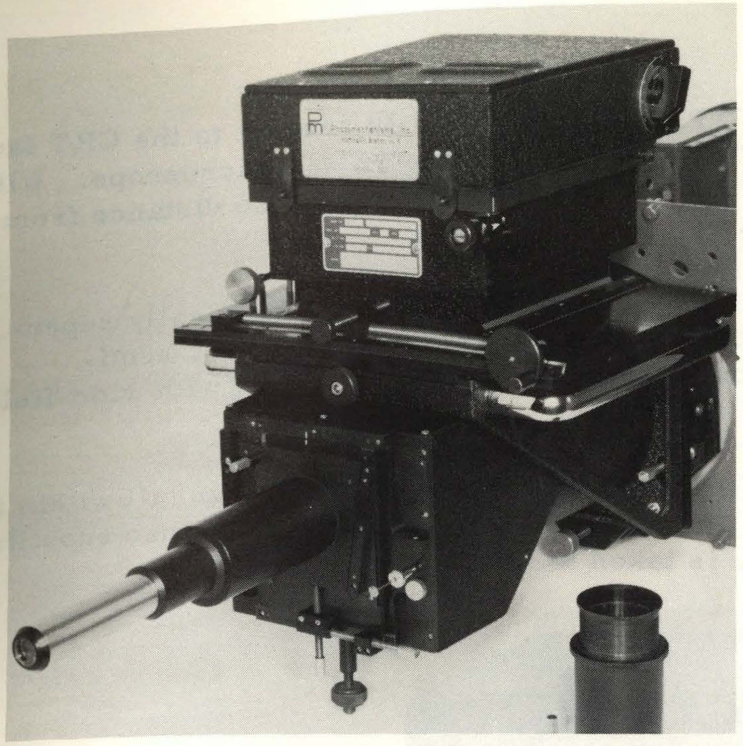
Fixture in carrying case with spare lamps and two wide field magnifier tubes.



Fixture opened showing calibrated lamp and internal mechanisms.

© 1963 PHOTOMECHANISMS, INC.

PRECISION IMAGE ALIGNMENT FIXTURE



CRT IMAGE ALIGNMENT FIXTURE

- Mounts to CRT display housing
- Optically superimposes reticle over CRT display
- Provides accurate reference for precise display adjustment under magnification
- Camera records reticle and display to verify alignment

HOW IT WORKS

A gimballed frame mounts a back-lit reference reticle parallel to the CRT face. A semi-reflecting pellicle allows superimposed viewing of reticle and display, with no parallax errors.

ENGINEERING CAPABILITIES APPLIED

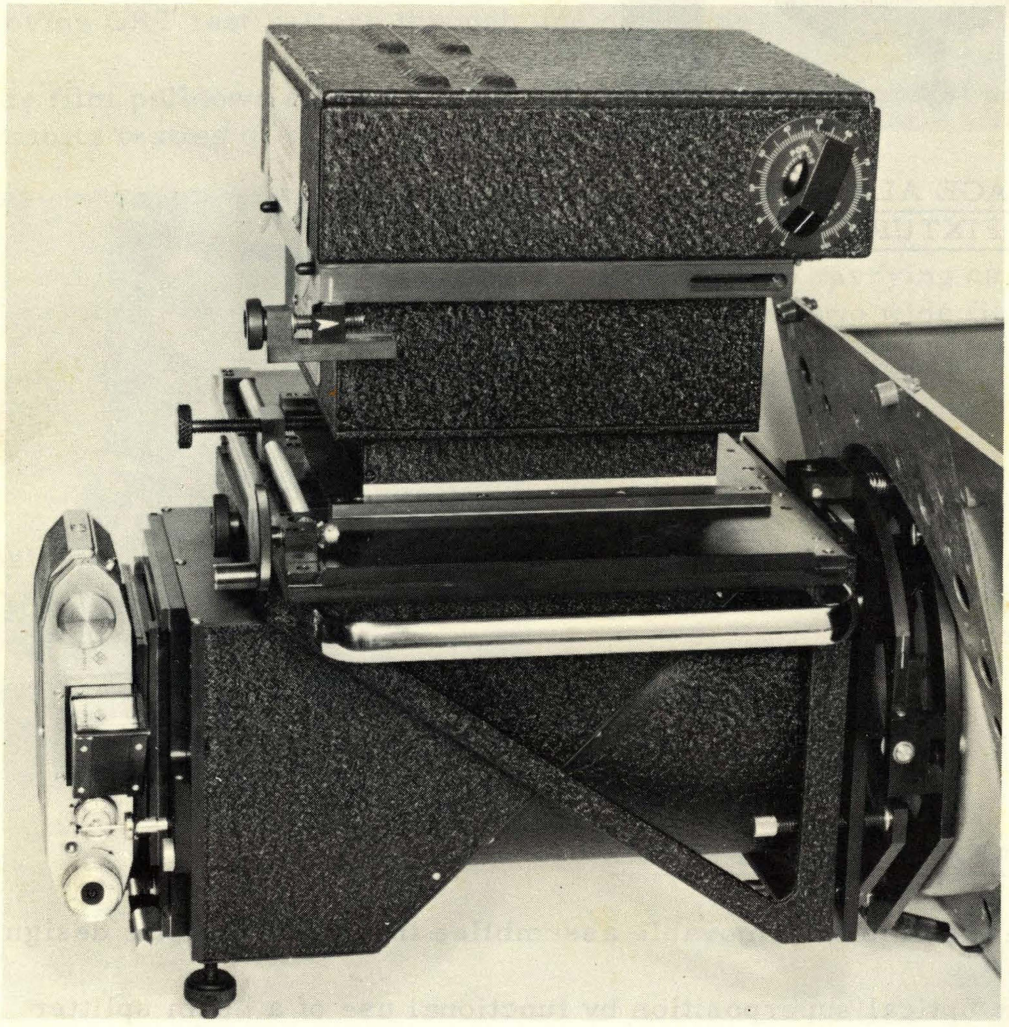
- Accurate location of removable assemblies through kinematic design
- Precision optical superposition by functional use of a beam splitter
- Practical methodizing of fixture setup procedure

TECHNICAL DATA

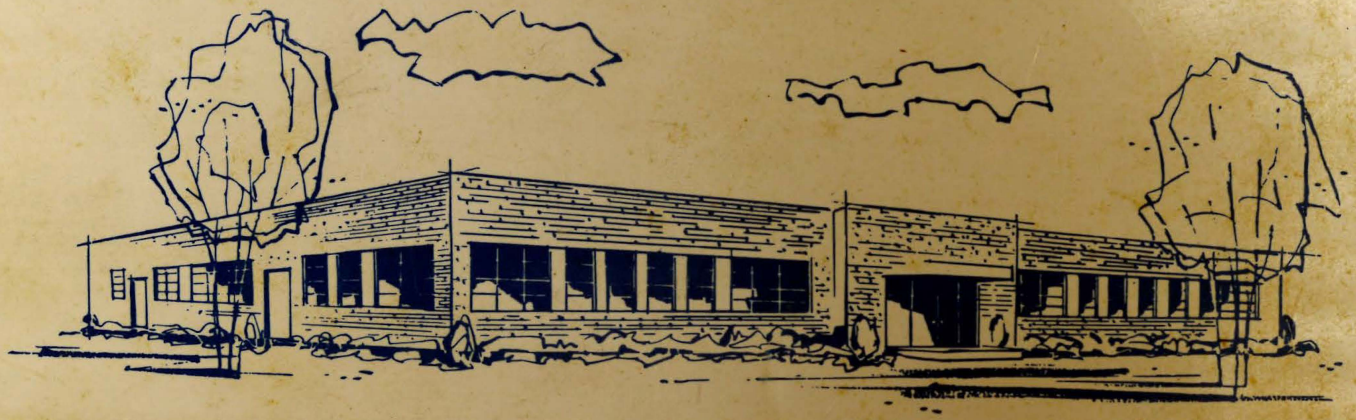
The fixture mounting frame is properly positioned with respect to the CRT face by referring to the phosphor surface through a shallow field microscope. With the frame properly located, the fixture is mounted at a precise distance from the CRT face, and parallel to it.

The back-lit reticle (clear lines on an opaque background) is optically superimposed on the CRT phosphor surface when viewed through a 45°, semi-transparent pellicle. A provision is made for viewing the CRT with wide-field magnifiers varying from 5 to 20 power.

The CRT deflection circuits are adjusted until the trace markings fall within the various tolerance limit lines on the reticle. A 35 mm camera is then substituted for the microscope and a picture is taken to verify proper alignment.



Fixture shown with camera attached for alignment verification.



RAPIDATA® PHOTO PROCESSORS • CINEFLUOROGRAPHIC CAMERAS
PHOTOGRAPHIC INSTRUMENTATION • OPTICS • ELECTRONICS

PHOTOMECHANISMS Incorporated

15 Stepar Place, Huntington Station, L. I., New York
(516) HA 3-4411